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INSTRUMENTATION AND INSTALLATION SCHEME OF A MECHANICALLY STABILIZED EARTH WALL ON I-15 WITH RESULTS OF WALL AND FOUNDATION BEHAVIOR

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UDOT RESEARCH & DEVELOPMENT REPORT ABSTRACT

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16. Abstract

This report contains the results of monitoring an instrumented Mechanically Stabilized Earth (MSE) wall located on the I-15 corridor through Salt Lake City, Utah. The wall is constructed on a soft clay foundation, and utilizes two different reinforcement configurations. The instrumentation placed within the wall and in the foundation material provides: a greater understanding of the behavior of the wall during and after construction, a comparison of the two reinforcement configurations, details relating to the internal and external stability of the wall, and data concerning foundation consolidation throughout primary and secondary consolidation of the foundation material. The report contains the data collected during construction and in the initial years following the end of construction.

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EXECUTIVE SUMMARY

This report presents the instrumentation installation plans and the measurements obtained for a mechanically stabilized earth (MSE) wall located along the I-15 reconstruction project in Salt Lake City, Utah. This is one of several reports to be submitted as a portion of this project. This report contains both the initial instrumentation plan and the monitoring of wall behavior during the construction process and also the initial post-construction monitoring report of behavior of the wall in the three years following construction. Future reports to be submitted will include the results of laboratory testing related to the foundation materials, the effects of sample disturbance on soil samples, the results of a computer model of the wall with comparisons to the measured behavior, and a long-term monitoring report to show the long-term behavior of the wall using continued measurements over time.

Important findings have been observed during and following the construction of this MSE wall. These include conclusions relating to the internal stability of the wall and also the internal and external wall displacements. These conclusions are based on data collected from extensive instrumentation located within the wall and in the foundation material beneath the wall. This instrumentation includes over 500 strain gages in the reinforcement bar mats and fascia panels, three vertical and two horizontal inclinometers, three Sondex settlement systems, five pressure cells, and 60 horizontal extensometers.

Conclusions Regarding Internal Stability

A number of conclusions are made concerning the internal stability of the wall.

- The maximum tension in the bar mats was much less than the allowable tension to which the bar mats could be subjected. The minimum ratio of the allowable yield stress to the tensile stress existing in the longitudinal bars of the reinforcement is 2.5 for one strain gage position, with only four gage positions having ratios less than 5.0 (out of more than 90 functional positions). Thus, the vast majority of the bar mats are subjected to tensile forces less than 20 percent of the yield strength of the material. The allowable stresses used in calculating these ratios considered the entire cross section of the longitudinal bar, not taking into account corrosion of the steel over time, which decreases the cross sectional area.

Similar calculations were performed to account for the decrease in the cross sectional area of the bars due to corrosion throughout the design life of the wall. For a 75 year design life, and allowing for 16 years for loss of the galvanization of the steel, the minimum ratio of the allowable yield stress to the tensile stress existing in the longitudinal bars of the reinforcement is 2.0, again for one strain gage position. Only four gages have ratios less than 4.2 after the same 75 year design life.

- From the measured lateral earth pressure coefficient K-values (as back calculated from tension measurements in the bar mats) it appears that the design K-value currently required by AASHTO (1998) is conservative. Figure 0.1 shows some of the K-values measured in the wall. A number of the back calculated K-values shown in Figure 0.1 appear to exceed the current AASHTO design envelope, but closer inspection shows that these values occur in the mats near the bottom of the wall early in the construction process. These mats show values well within the design envelope once the construction has progressed. It is concluded that these higher values of K can be attributed to residual compaction stresses, and are not of concern.

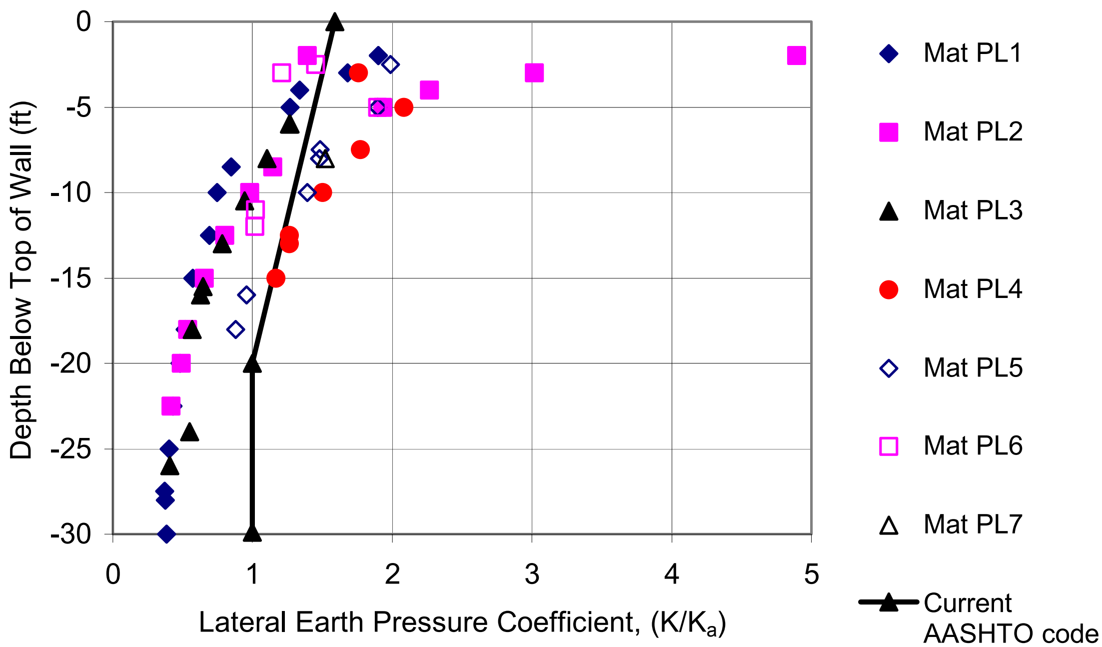

Figure 0.1. Normalized values of K for the section of Wall R-346-1C with primary reinforcement only.

- The vertical stress distribution followed a pattern similar to other instrumented MSE walls, with low vertical stresses near the face of the wall, stresses increasing to a maximum value approximately 6 ft (1.83 m) from the wall face, then decreasing to the stress expected from overburden ($\sigma_v = \gamma h$) at some distance from the wall face. The measured vertical stresses obtained during the application of the surcharge load during wall construction are presented in Figure 0.2.

Also shown in this figure is the vertical stress calculated due to overburden (γh) at the time the surcharge was applied, as well as the stress calculated using the Meyerhof equation as per AASHTO (1998). Due to the fairly significant wall height (36 ft (11 m) with maximum surcharge), the eccentricity associated with the Meyerhof equation becomes large, producing calculated vertical stresses near the wall face that far exceed the vertical stresses measured in the wall. Thus, the measured vertical stress distribution in the wall recorded in this study is not reflective of the stresses required for use in design by AASHTO (1998).

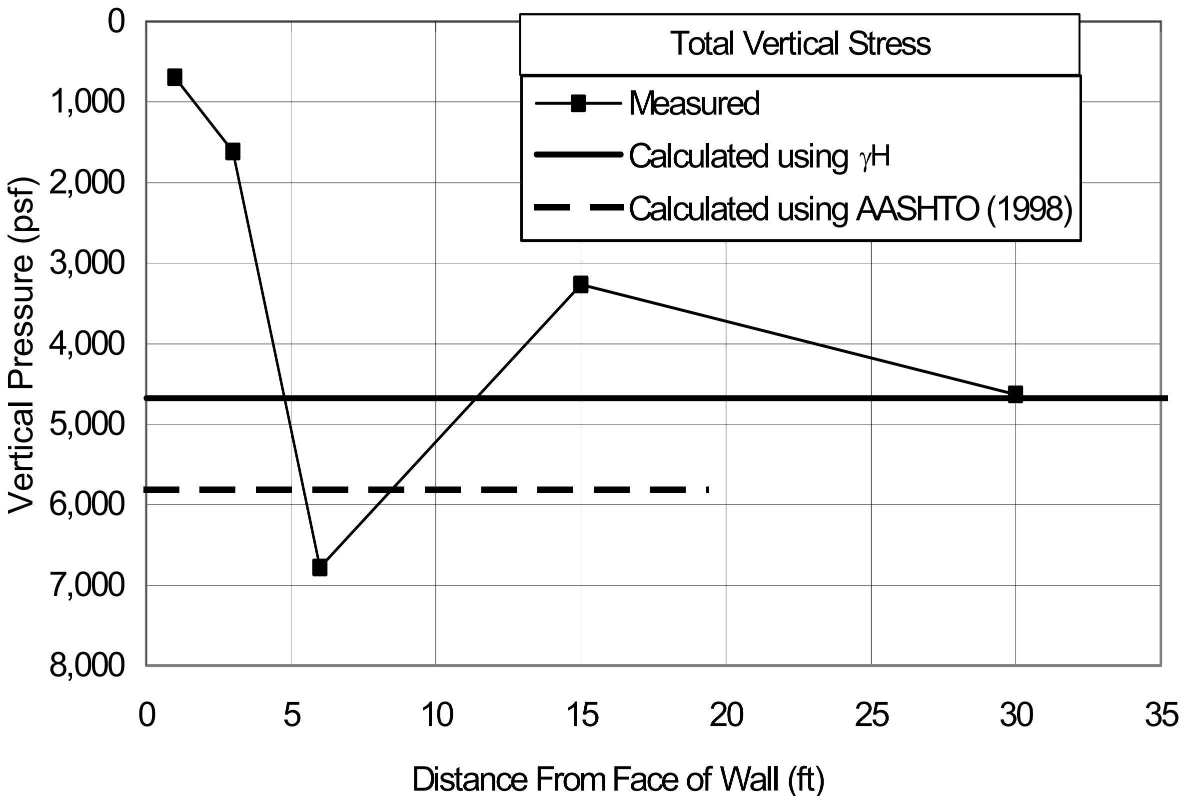

Figure 0.2. Plot of vertical pressure versus distance from wall face during time in which surcharge was applied to the wall.

- Minimal internal deformations were measured. Data collected from the horizontal extensometers showed that the wall essentially moved as a rigid body, with little differential movement. Practically no differential movement occurred between extensometers located 4 ft (1.22 m) from the wall face and extensometers located 16 ft (4.88 m) from the wall face. There was some movement within the soil mass from the wall face to a distance of 4 ft (1.22 m) from the face, possibly due to the fact that less compaction energy was used close to the wall face. The overall movement of the extensometers was on the same order as the movement of the entire wall measured by the vertical inclinometer measurements, again confirming the rigid movement of the wall. On average, the vertical inclinometers measured a horizontal displacement of 3.5 inches (89 mm) at the base of the wall. Extensometers in the same general area also near the base of the wall showed 3 inches (76 mm) of movement 16 ft (4.88 m) from the wall face, with increasing movement toward the face of the wall. Extensometer measurements showed a decrease in lateral movement moving from the base of the wall to the top of the wall, with incremental movements decreasing near the base of the wall throughout the construction process. Some deformations were monitored in the wall face near the toe of the wall, but these deformations were determined to be localized and not indicative of global instability in the wall.

- Vertically, during construction, the wall settled approximately 1.5 ft (0.46 m). Most of this settlement occurred in the two soft clay layers located in the upper 22 ft (6.7 m) of the soil profile beneath the rubble backfill on which the wall was constructed. Survey monuments showed that no measurable settlement occurred outside the wick drain zone, while monuments within the wick drain zone verified the settlements measured using the horizontal inclinometers. From the end of primary consolidation until the most recent measurements were taken (around 2.5 years after the end of construction), only 0.3 inches (0.025 ft or 7.6 mm) of wall settlement has occurred. This deformation is due to secondary consolidation of the foundation soils, and will continue to be monitored for a number of years. Assuming the wall continues to follow secondary consolidation behavior, it appears the design criterion of a maximum of 3.0 inches (76.2 mm) of post-construction movement in the first 10 years after construction will easily be met.

- Total wall deformations are shown in Figure 0.3, in which the movements are exaggerated for clarity. Wall settlement was approximately 20 inches (0.51 m) at the time the most recent measurements were taken. Horizontal movement at the base of the wall was 3.5 inches (89 mm). Rotation of the wall was on the order of 0.2 degrees. Each of these deformations will continue to be monitored over time to observe secondary consolidation effects. Horizontal movement outside the wick drain zone (I-15 right-of-way) was 0.3 inches (7.6 mm) at the ground surface and decreased with depth.

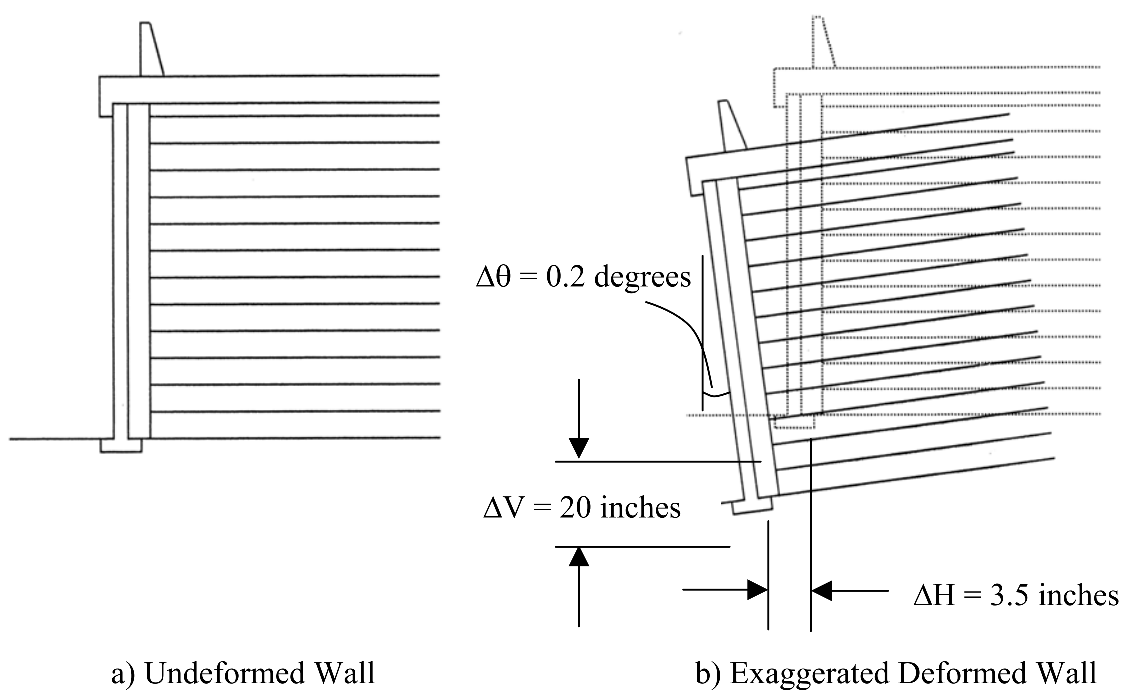

Figure 0.3. Comparison of the undeformed wall to an exaggeration of the deformed wall.

Conclusions from Comparison of Reinforcement Systems

The portion of wall that was instrumented contained two reinforcements systems. One section, referred to as the primary reinforced only section, contained the initial design used by VSL, with 24 ft (7.32 m) long bar mats with a 30 inch (0.76 m) vertical spacing between reinforcement layers. This system had experienced some problems with constructibility due to some significant face deformations near the base of the wall at some other walls along the I-15 corridor. These constructibility issues as well as concerns regarding the stability of this system caused a design change. This resulted in the addition of intermediate layers of reinforcement in the bottom half of the wall. These bar mat layers were 10 ft (3.05 m) long, and were placed halfway between the layers of primary reinforcement. Instrumentation was placed in sections of the wall containing both systems to compare the behavior of the two sections as well as determine the stability of both sections. Conclusions relating to these two systems are given here.

- As the primary purpose of the intermediate reinforcement was to reduce the excessive bulging that had been noted near the base of several other walls, steps were taken to monitor this bulging during construction for both sections of the wall. In the section containing only primary reinforcement, a bulge on the order of 4 inches (102 mm) developed during wall construction and extended over a fairly large distance (approximately 17 ft (5.18 m)). The maximum bulge found in the section containing both primary and intermediate reinforcement was only 2.7 inches (69 mm) and was only prominent for a distance of approximately 4 ft (1.22 m). Thus, it appears that the addition of intermediate reinforcement did reduce the bulging near the toe of the wall significantly. It should be noted, however, that neither of the bulges monitored at the two sections of wall was found to be indicative of a stability problem.

- The section containing both primary and intermediate reinforcement was subjected to higher tensile stresses than the section with only primary reinforcement. One possible reason for this is that the section with additional reinforcement is behaving more rigidly, such that less internal deformation takes place. This causes the soil to stay closer to the at-rest condition, such that stresses in the soil are higher than for soil allowed to deform and move toward the active state. These increased stresses in the soil are transferred to the reinforcement, causing the increased stresses to be observed in the section with additional reinforcement.

- Both systems are stable. When considering both internal and external stability, both the section containing only primary reinforcement and the section containing primary and intermediate reinforcement are stable and in good condition.

- The intermediate reinforcement could have been omitted if other methods of controlling the deformation had been found. Possible alternatives that may be considered are the following:
    - Using a uniform gravel as fill near the wall face,
    - Temporary support of the wall face during compaction.

Overall Conclusions

Overall, throughout construction and in the years following construction the wall is performing well. Results of this study show that there is adequate reinforcement within the wall, with stresses in the reinforcement being well below the allowable. The wall has been determined to be internally stable. The deformations near the wall face were determined to be localized and not due to internal instability. The wall has also been found to be stable externally. The expected large primary settlement of the wall did occur, but little secondary settlement has taken place. Finally, a comparison of the section of wall containing only primary reinforcement to that containing primary and intermediate reinforcement led to the following conclusions:

- Intermediate reinforcement was not necessary for stability of the wall, since the section of wall not containing additional reinforcement was found to be both internally and externally stable,
- Intermediate reinforcement did decrease the deformations of the wall face in the lower portion of the wall, resolving the constructibility issues that had been a problem with previous walls not containing the intermediate reinforcement, and
- Intermediate reinforcement could be omitted without consequence if another method to control deformations of the wall face is utilized.

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CHAPTER 1

INTRODUCTION

1.1 MSE Wall Systems

The mechanically stabilized earth (MSE) wall system developed by the VSL Corporation uses welded-wire reinforcing bar mats, which vary in width and length depending on design requirements for a particular project. The bar mats are placed between layers of backfill and connected by pins to galvanized steel mesh fascia panels. Figure 1.1 is a schematic of a typical section of an MSE wall. The thickness of the soil layers between bar mats is 30 inches (0.76 m) as per the VSL design of this project. A design change in the wall system for the I-15 project was made when excessive bulging developed at the bottom of the wall face. This adjusted design added an additional shorter bar mat called an intermediate mat. This mat was placed between existing bar mats in the lower half of the wall. This decreased the thickness of the soil layers to 15 inches (0.38 m).

A bar mat consists of 24 ft (7.32 m) long longitudinal wires spaced at 6 inches (152 mm) and welded to transverse bars spaced at 12 inches (305 mm) to 24 inches (610 mm) depending on the placement of the mat within the wall. The number of longitudinal wires varies from 4 to 6, again depending on the position of the reinforcement within the wall. The intermediate bar mats consist of 10 ft (3.05 m) long longitudinal wires spaced at 6 inches (152 mm) and are welded to transverse bars spaced at 12 inches (305 mm). Again, the number of longitudinal bars is dependent on the position of the reinforcement within the wall. Fascia panels are made up of a grid like pattern consisting of longitudinal and transverse wires spaced at 6 inches (152 mm).

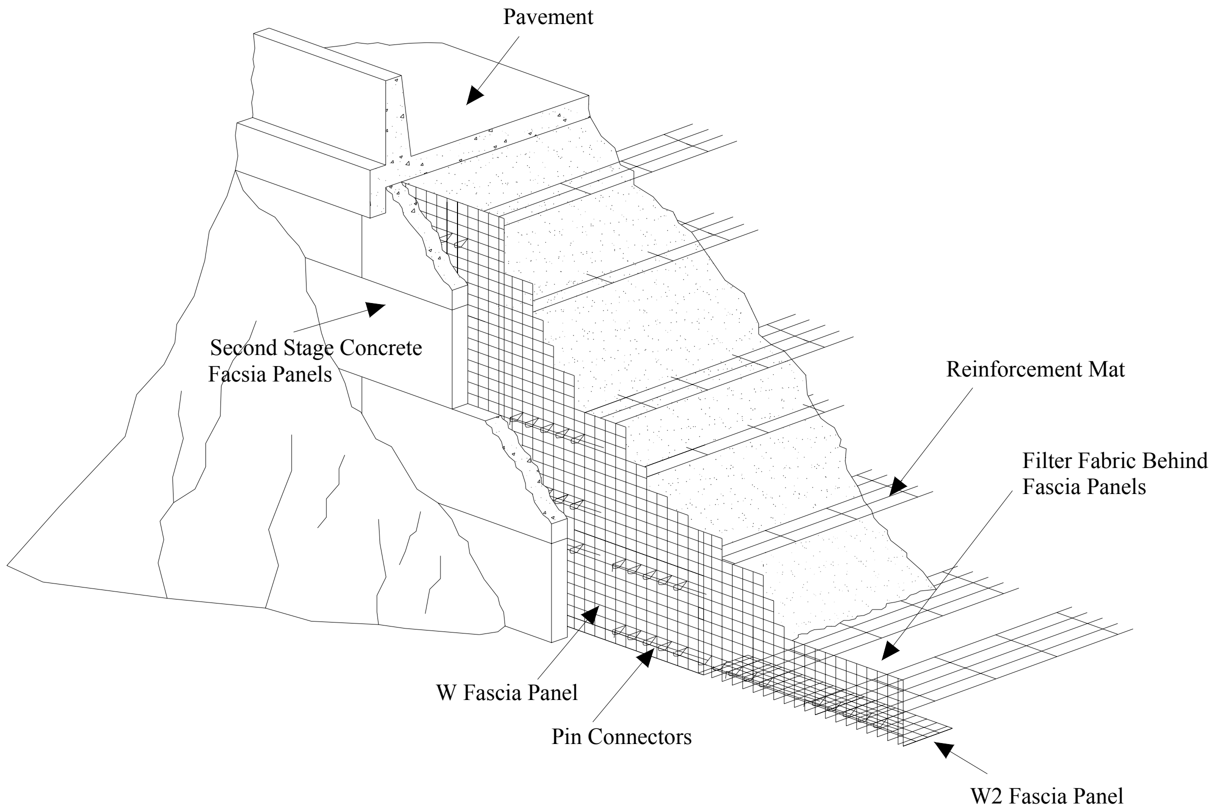


Figure 1.1. Schematic of a typical MSE wall system used on the I-15 reconstruction project.

Current design of these MSE walls is derived mostly from previous studies of instrumented walls. Utah State University has carried out many of the research programs implemented in the past. After instrumentation of a wall in Seattle, Washington (Anderson, Sharp, and Harding, 1987), an envelope for the lateral earth pressure coefficient, K, was developed from the results of that study. Based on this lateral earth pressure coefficient envelope, Anderson, Sharp, and Harding (1987) suggested that a K value of 0.65 should be used for the design on welded wire walls less than 15 ft (4.57 m) high. A K value of 0.45 is recommended for walls that are taller than 20 ft (6.1 m). Results from this study are compared to the suggested envelope given by Anderson, Sharp, and Harding (1987).

1.2 Objectives and Scope of Research

Wall R-346-1C is located on I-15 at approximately 3600 South on the West side of I-15 as shown in Figure 1.2, and is about 30 ft (9.14 m) tall at the area of instrumentation. MSE walls of this height on similar foundation soils typically experience about 3 ft (0.91 m) of settlement near the face of the wall. Therefore, these wire-faced walls exhibit large deformations particularly around the wall foundation. These deformations include bulging, sagging, and negative batter. It is not completely apparent whether these deformations are associated with overstressing of the wall, or are merely localized deformations near the face of the walls.

Because of the deformations observed in walls constructed early in the project, design modifications have been implemented. These modifications include shorter, intermediate bar mats between the lower primary reinforcement mats. These intermediate bar mats are placed from the bottom of the wall up to a height 15 ft (4.57 m) below the top of the wall, which were the design criteria outlined by the VSL Corporation. The task of the research undertaken by Utah State University has been to instrument two sections of wall R-346-1C to monitor stresses and deformations in the wall and deformations in the foundation soils throughout construction, primary consolidation, and secondary consolidation.

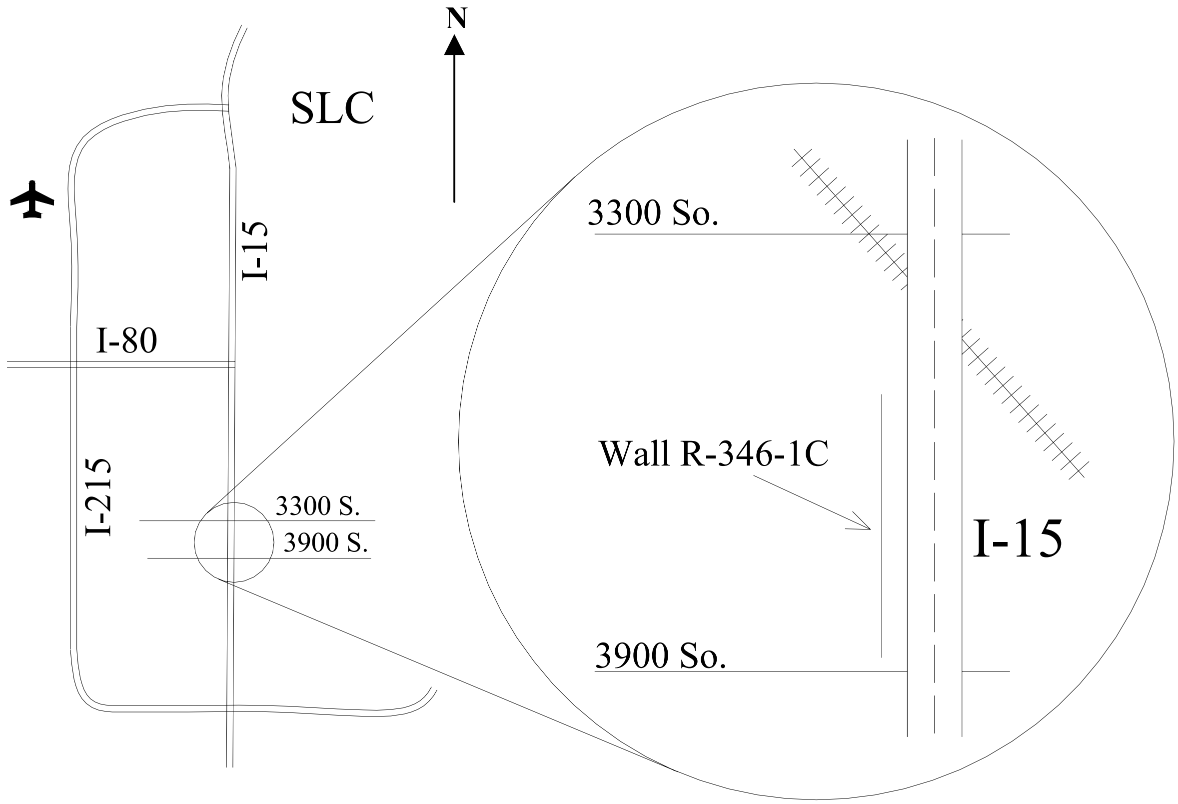


Figure 1.2. Site location of MSE Wall R-346-1C.

This document reports the results of monitoring through the construction process and the initial years following construction. The instrumentation in Wall R-346-1C includes the following: (a) strain gages on the bar mats to monitor tension in the longitudinal members, (b) pressure cells in the wall backfill to monitor vertical pressure, (c) horizontal and vertical inclinometers in the foundation and wall backfill to monitor the sub-surface movement, (d) horizontal extensometers in the wall backfill to monitor the horizontal movement of the wall, (e) Sondex systems in the wall backfill and foundation to monitor settlement, and (f) survey monuments at the ground surface outside the wall backfill to measure settlement.

Since the wall had a design change, it was decided to monitor two different sections of wall that consisted of the old design and new design. The older design section of wall only utilized 24 ft (7.32 m) primary mats spaced in lifts of 2.5 ft (0.76 m). The newer design section utilized both the long primary mats and the 10 ft (3.05 m) intermediate mats. Throughout this report the older design is referred to as the primary reinforcement only section and the newer design is referred to as the intermediate and primary reinforcement section. Figure 1.3 shows a plan view of the two different instrumented sections of wall along with other instrumentation and Figure 1.4 gives an elevation view of all the instrumentation installed in the wall. Details of the instrumentation plan are given in Chapter 4.

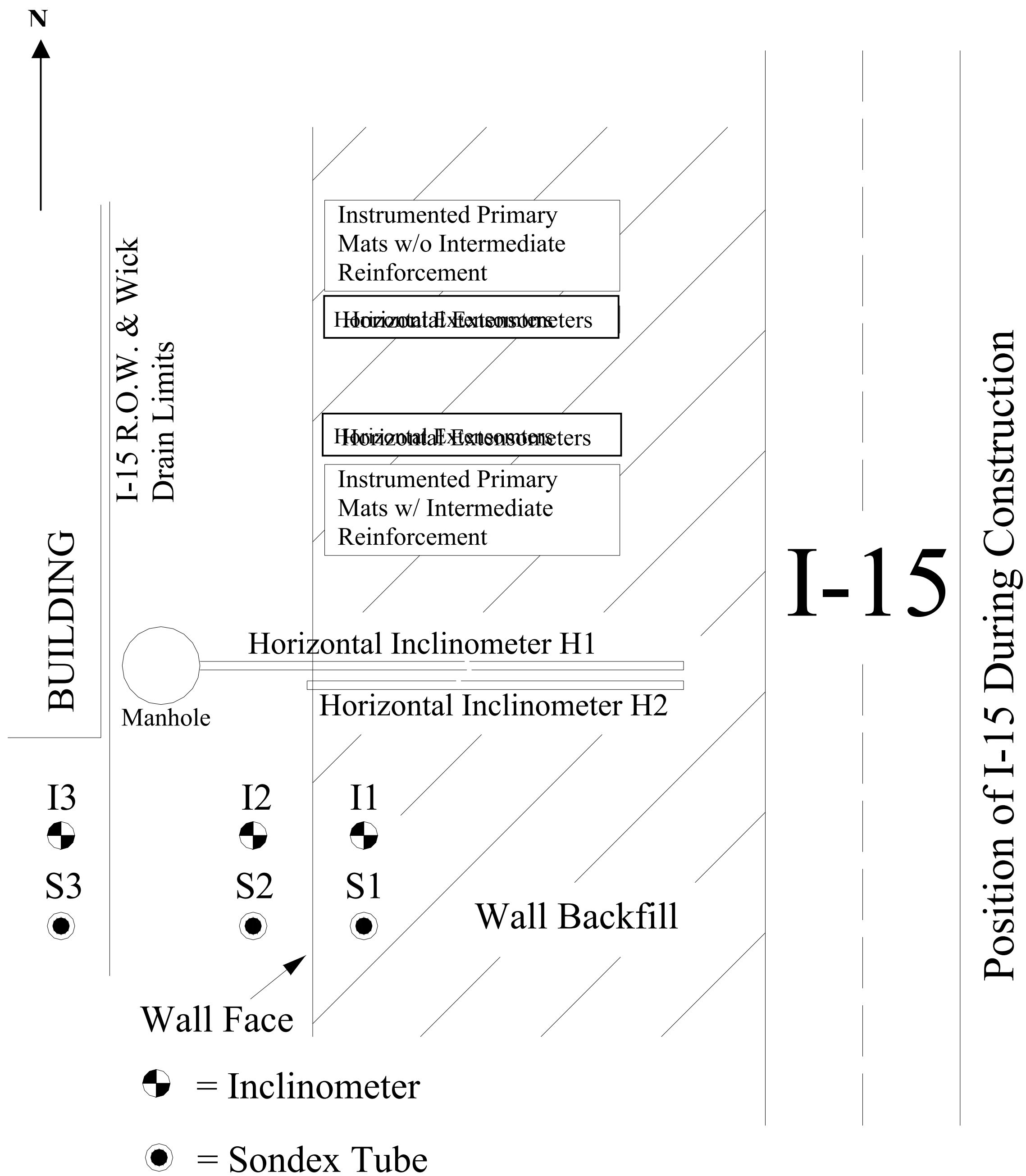


Figure 1.3. Plan view of the two-instrumented sections of wall with instrumentation.

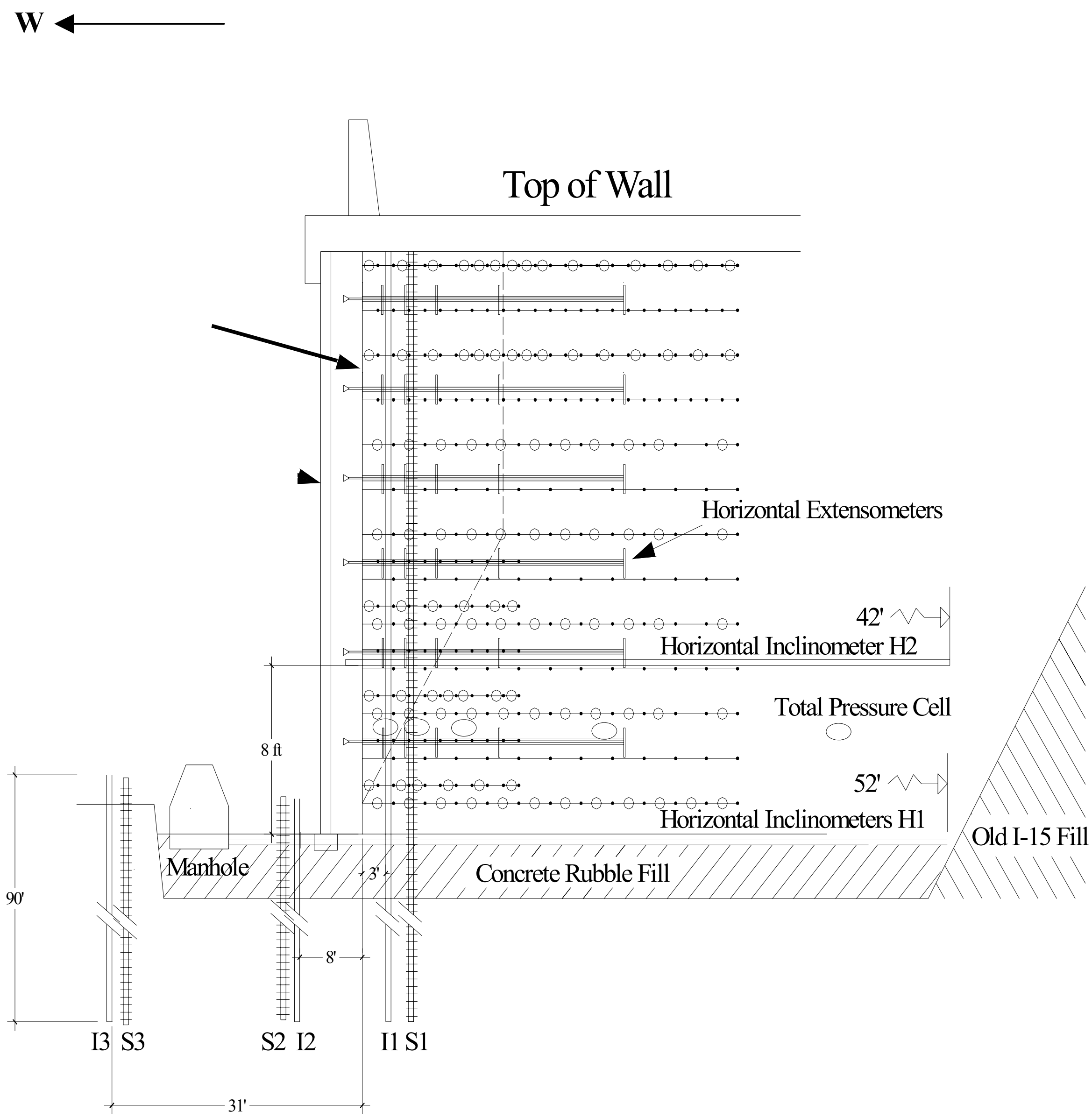


Figure 1.4. Elevation view of all instrumentation.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

This chapter discusses a few of the previous studies done on MSE walls. Many of these studies have significantly affected the design procedures of MSE walls since the French engineer Henri Vidal developed the concept (Vidal, 1969). Vidal's original design used steel strips as reinforcement. This technology came to the U.S. in 1972, and since then many other methods have be introduced.

2.2 Lateral Earth Coefficient Parameters

An important factor in the design of these walls is the lateral earth coefficient, K. This parameter controls the tension in the reinforcement and the internal stability of the wall. The lateral earth coefficient is dependent upon the amount of yielding that occurs within the wall. Wall yielding is controlled by the type and amount of reinforcement used in the system. Low values of K are expected in less rigid soil structures where higher values of K are found in stiffer structures.

In 1979, Bishop and Anderson instrumented a welded wire wall in the San Gabriel Mountains in California. They found that for welded wire walls up to 20 ft (6.1 m) high, the upper limit of lateral earth pressure coefficient, K, was 0.65. Other studies on a taller wall in Seattle, Washington (Anderson, Sharp, and Harding, 1987) resulted in the envelope for K shown in Figure 2.1. Results from this study correlate with other recommendations (Bishop and Anderson, 1979; Anderson and Wong, 1989) and are currently used in the design of welded wire walls.

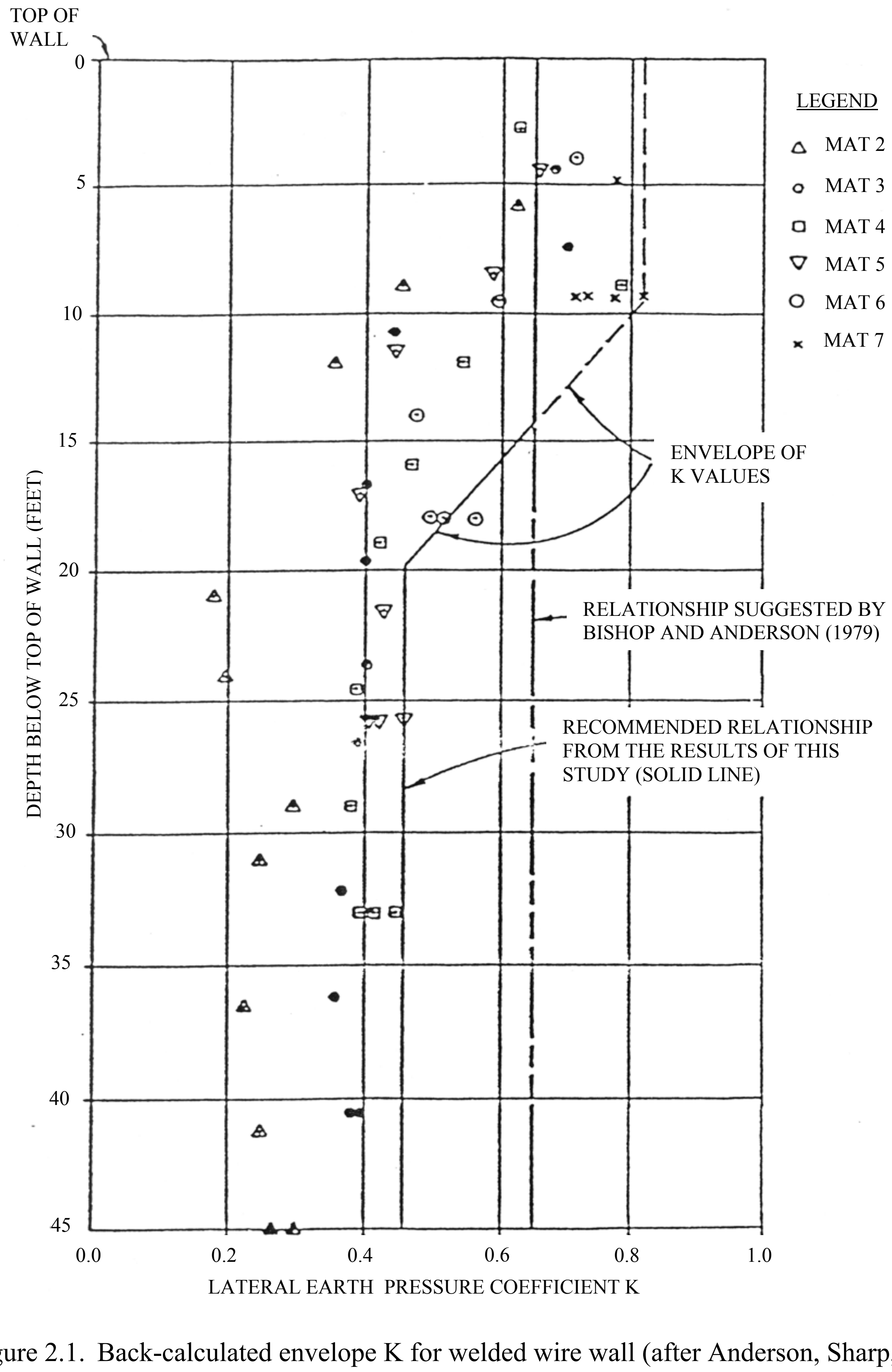


Figure 2.1. Back-calculated envelope K for welded wire wall (after Anderson, Sharp, and Harding, 1987).

For MSE walls, K varies linearly from the at-rest case (K_o) at the top of the wall to the active case (K_a) at a depth of 20 ft (6.1 m). Below a depth of 20 ft (6.1 m), active values of K are recommended (Mitchell and Villet, 1987). From compiled values of K found on other wall systems, Christopher et al. (1989) compiled a comprehensive manual of practice on reinforced soil structures. Some of the guidelines published by Christopher et al. (1989) suggested a general envelope of K for welded wire mesh systems that was based on Figure 2.1, which normalized the design values with respect to the active earth pressure coefficient (K_a) for various reinforcement systems. These values are shown in Figure 2.2.

The American Association of State Highway and Transportation Officials (AASHTO, 1998) bridge manual recommends that these structures be designed using K = K_o at the top of the structure and decreasing linearly to K = K_a at 20 ft (6.1 m) (AASHTO, 1998). Below a 20 ft (6.1 m) depth, K = K_a is used. This corresponds to the recommendations that Christopher et al. (1989) gave for the values of K. AASHTO recommends that the maximum friction angle used in the computation of horizontal force within the reinforced soil mass be 34 degrees, unless the backfill used has been tested for frictional strength by triaxial or direct shear testing. The values of K_a and K_o are computed as follows:

$$K_a = \tan^2(45 - \phi'/2) \qquad (2.1)$$

$$K_o = 1 - \sin\phi' \qquad (2.2)$$

AASHTO also suggests that the bilinear failure surface be assumed during design of these walls (Figure 2.3).

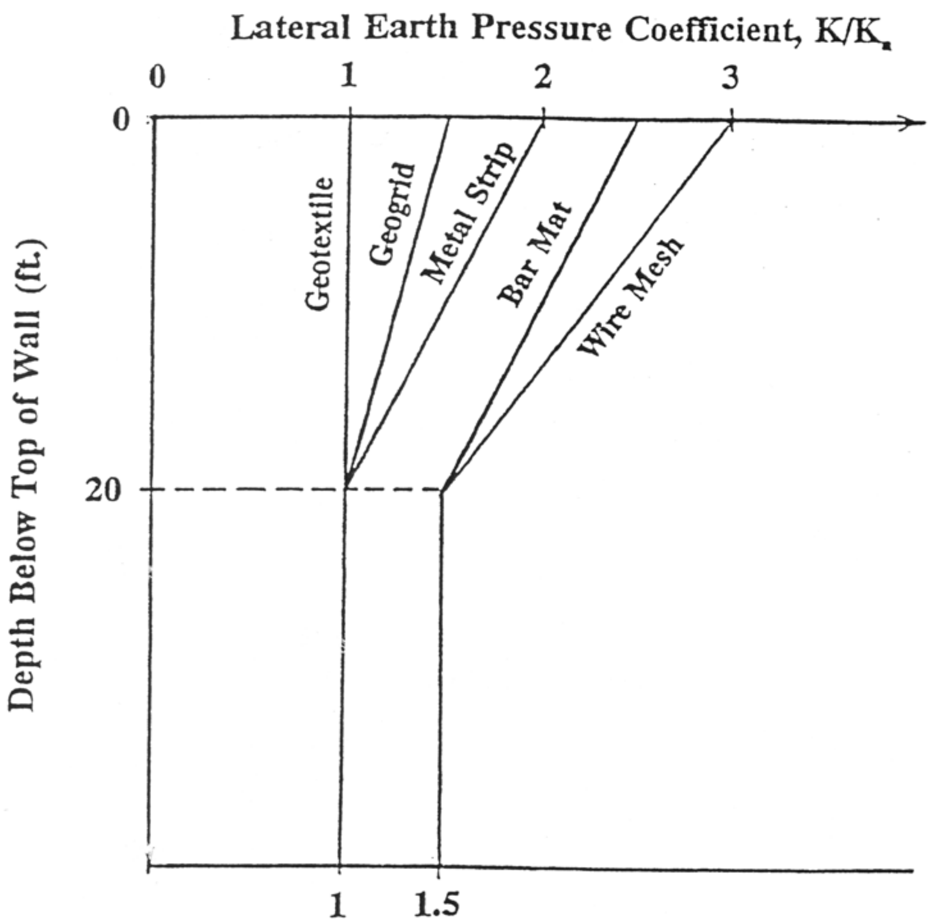


Figure 2.2. Normalized design envelope of K (after Christopher et al., 1989).

2.3 Potential Failure Planes and Modes

Christopher et al. (1989) have given two types of potential failure planes that depend on the stiffness of the reinforcement system used. For inextensible reinforcement such as the VSL mats used in this study, the failure plane can be assumed to be a two-part bilinear failure surface as shown in Figure 2.3. The extensible failure plane corresponds to soil reinforcements such as geotextiles and geogrids. The failure plane stress for these closely relates to the Coulomb failure plane given in Figure 2.4.

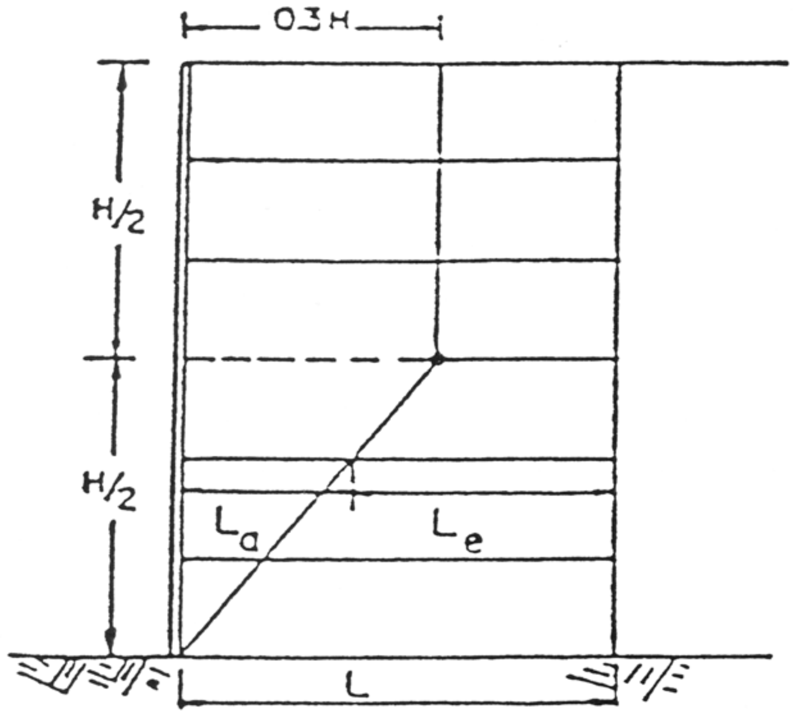


Figure 2.3. Location of potential failure surface in inextensible reinforcements (after Christopher et al., 1989).

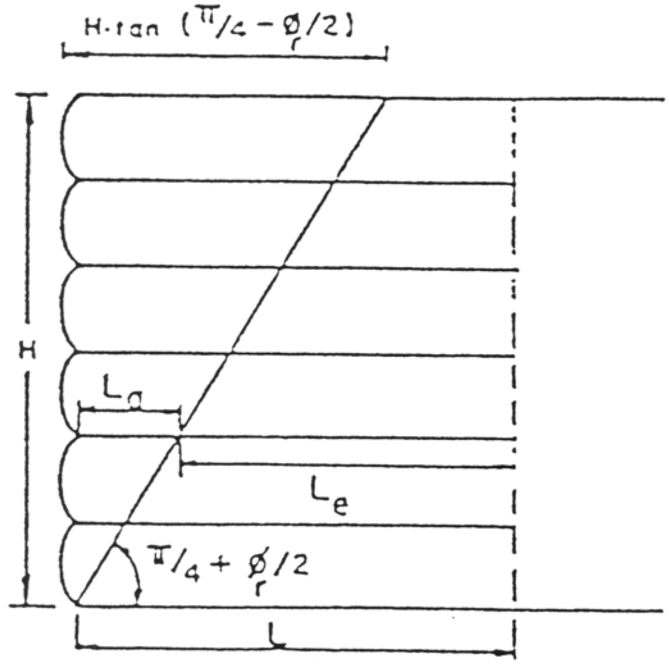


Figure 2.4. Location of potential failure surface in extensible reinforcements (after Christopher et al., 1989).

Design for MSE structures must satisfy two criteria: (1) external stability and (2) internal stability (Lee, Adams, and Vagneron, 1973; Anderson, Sharp, and Harding, 1987; Mitchell and Villet, 1987). Considering the entire reinforced soil mass as a semirigid structure, external stability is evaluated against the following criteria (a) sliding, (b) overturning, (c) bearing capacity, and (d) deep stability (Figure 2.5). Internal stability of reinforced structures is evaluated against (a) tension in reinforcing elements and (b) pullout resistance of the reinforcing elements (Figure 2.6).

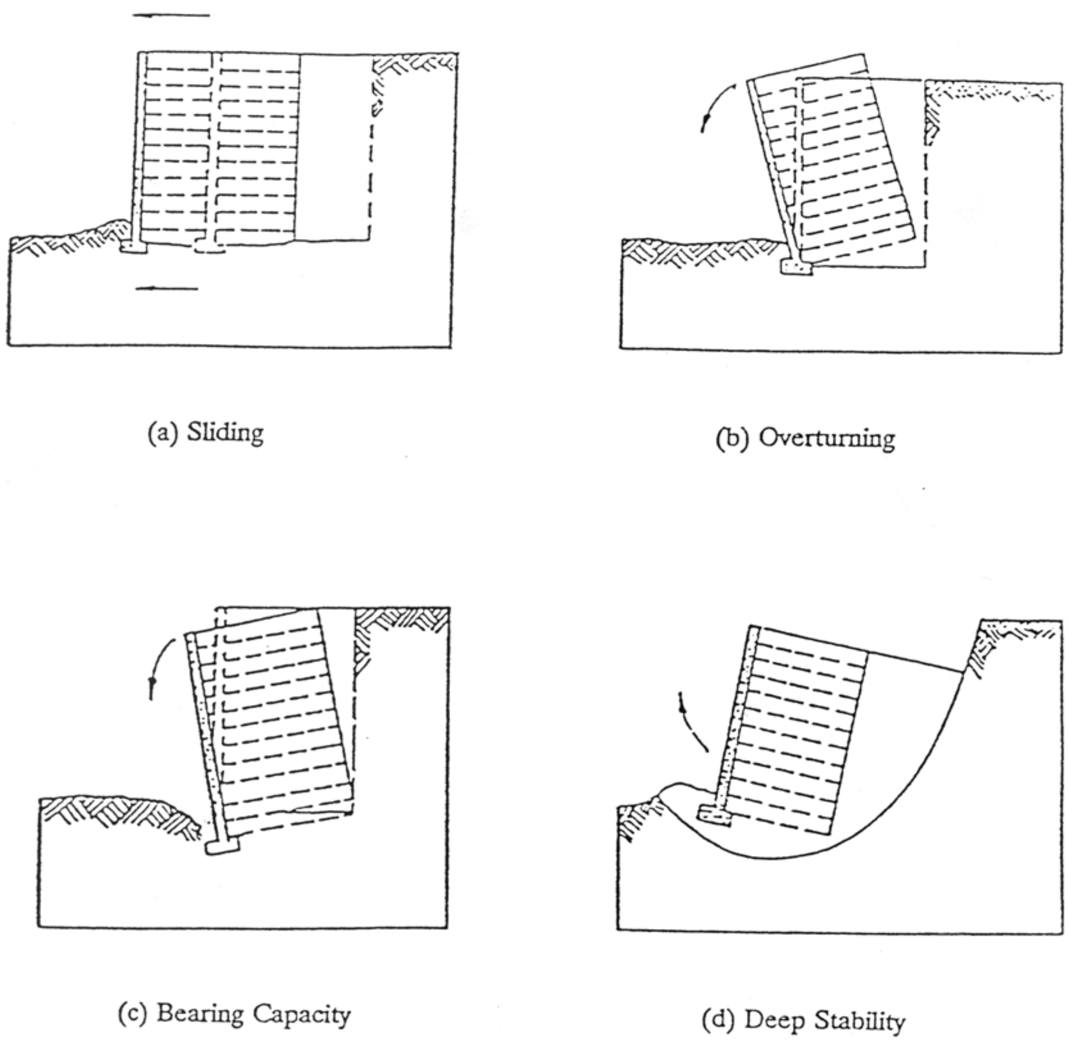


Figure 2.5. External stability mechanisms of failure in reinforced soil walls (after Christopher et al., 1989).

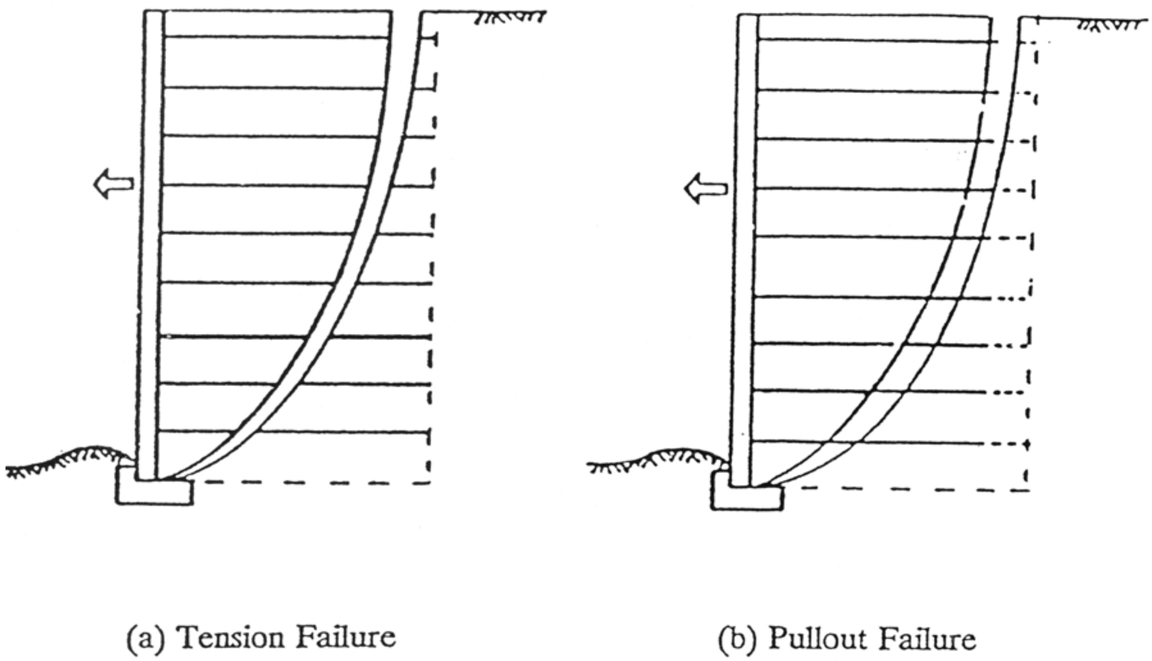


Figure 2.6. Internal stability mechanisms of failure in reinforced soil walls (after Christopher et al., 1989).

CHAPTER 3

FIELD AND LAB TESTING

3.1 Introduction

Field activities related to geotechnical soil borings are discussed in this section. Included are discussions of drilling methods, sampling methods, and groundwater observations. The interpreted subsurface soil conditions based upon field exploration and laboratory testing are discussed in this chapter.

3.1.1 Drilling Methods

The six soil borings (Figure 3.1) for this project were drilled using a truck-mounted drill rig. The borings were drilled using wet rotary techniques. Soil samples were collected in only two of the borings done, I2 and S2, which are located about 8 ft (2.44 m) from the wall face. I2 designates the second vertical inclinometer boring, while S2 designates the second vertical Sondex boring, as shown in Figure 3.1. Boring S2 was sampled with Shelby tubes and a Split spoon sampler beginning at a depth of 10 ft (3.05 m) and sampled every 5 ft (1.52 m) to a depth of 85 ft (25.9 m). Boring I2 was sampled with a Piston Sampler beginning at a depth of 10 ft (3.05 m) and sampled at various depths with the last sample pushed at 65 ft (19.8 m).

Detailed descriptions of the soils encountered in boring S2 are shown in Figure 3.2. Figure 3.3 gives the soil description of soil found in boring I2. Figure 3.4 is a classification of symbols and graphs used on each boring log.

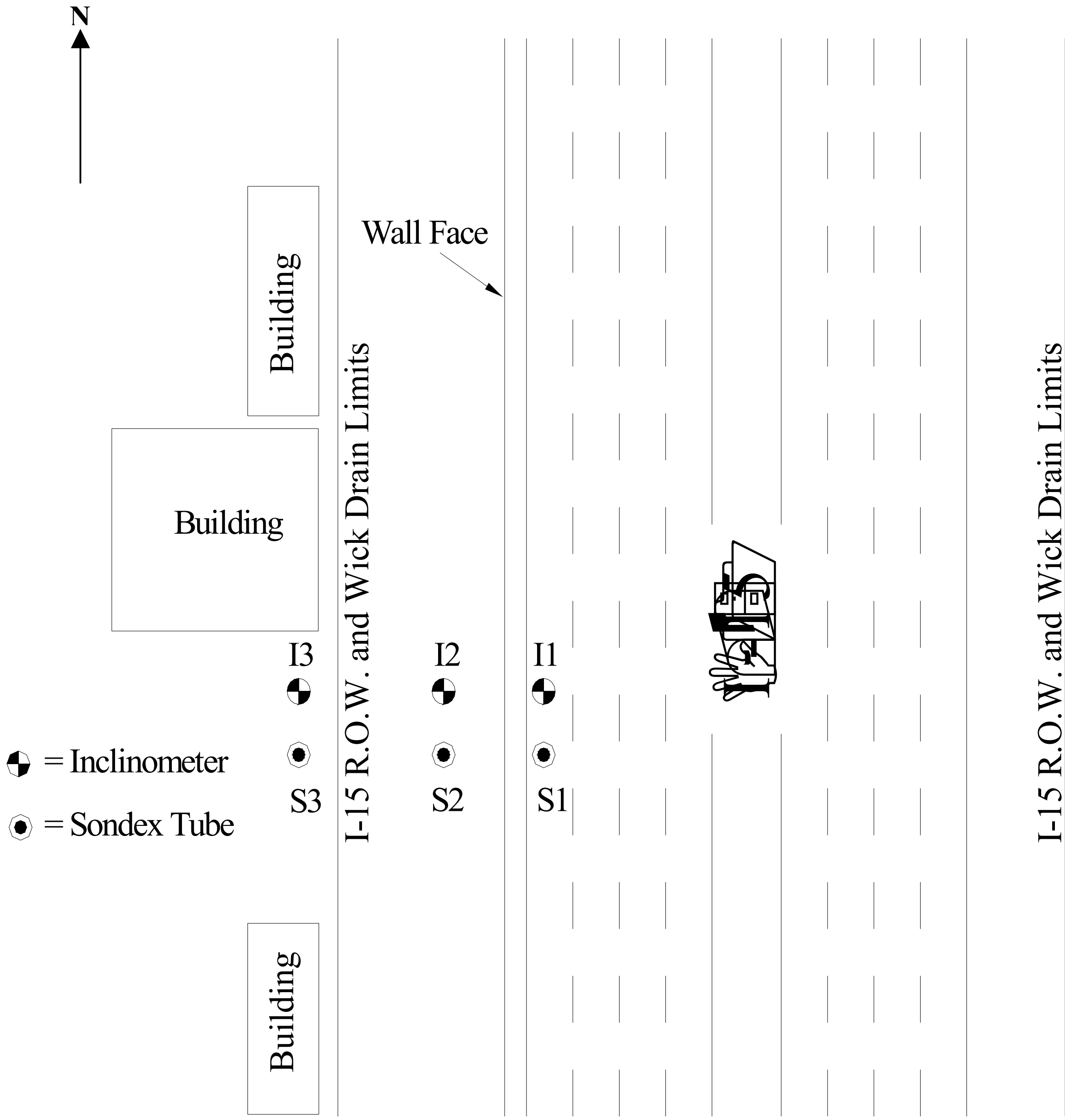


Figure 3.1. Plan of borings.

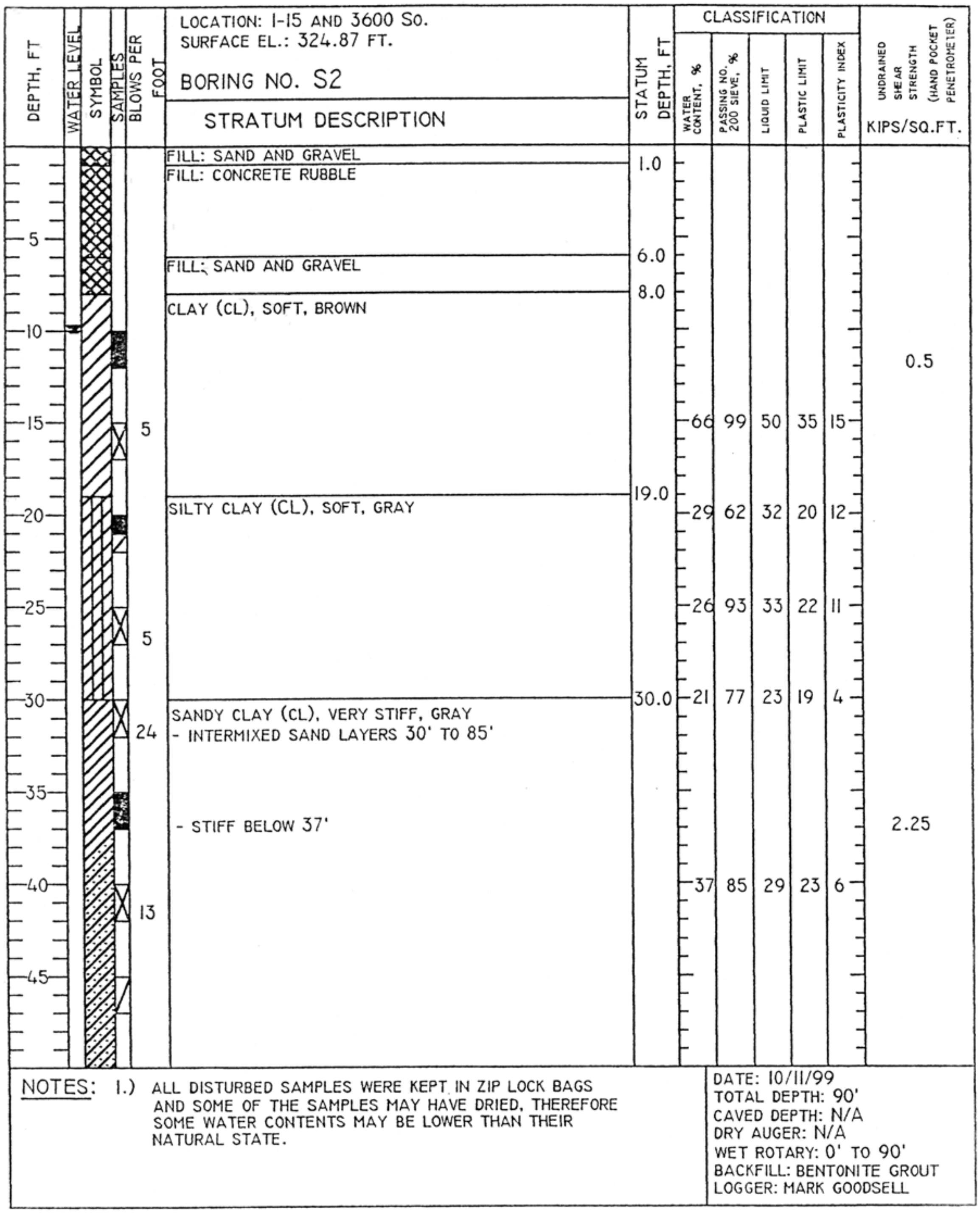


Figure 3.2. Log of boring No. S2.

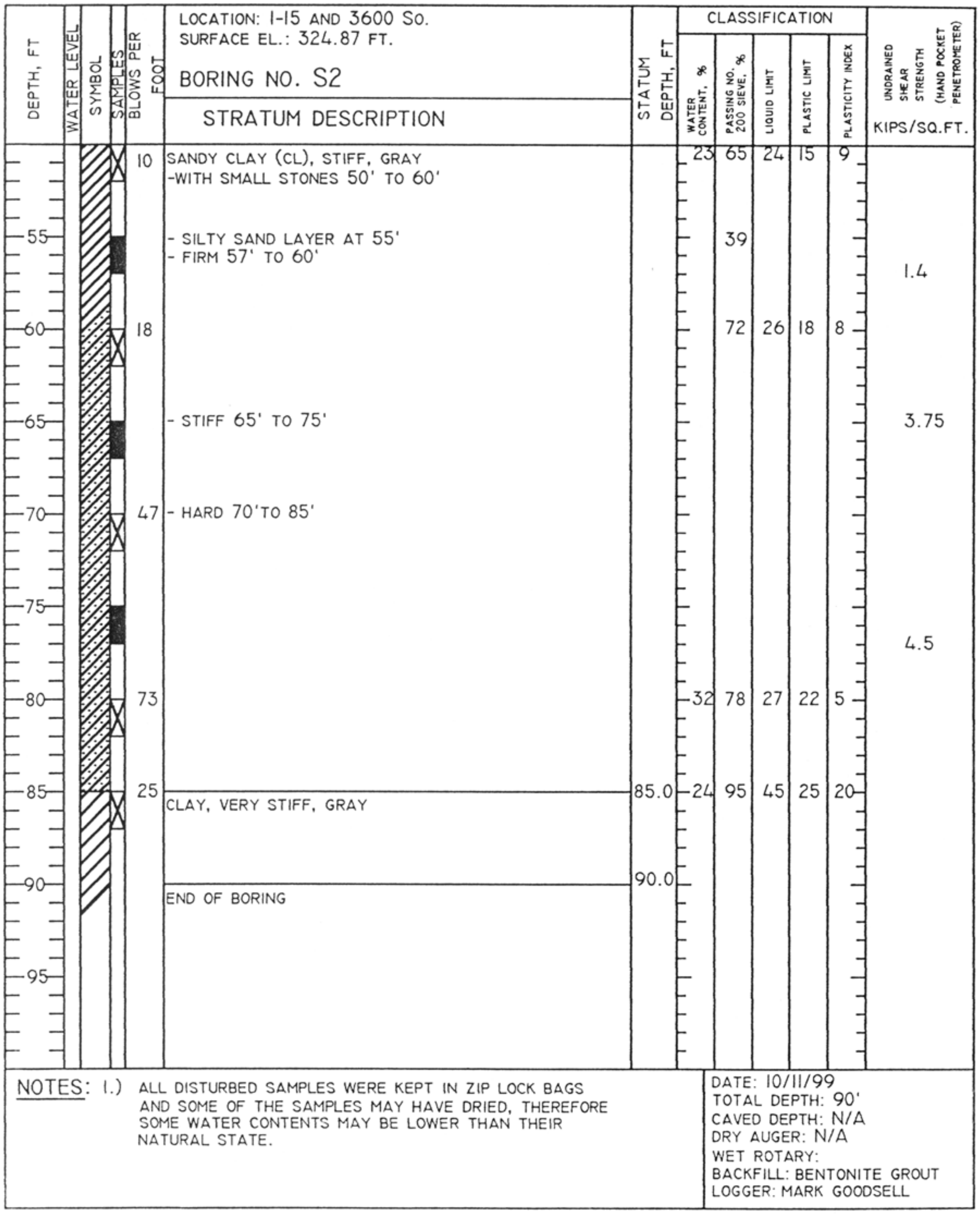


Figure 3.2. Log of boring No. S2 (continued).

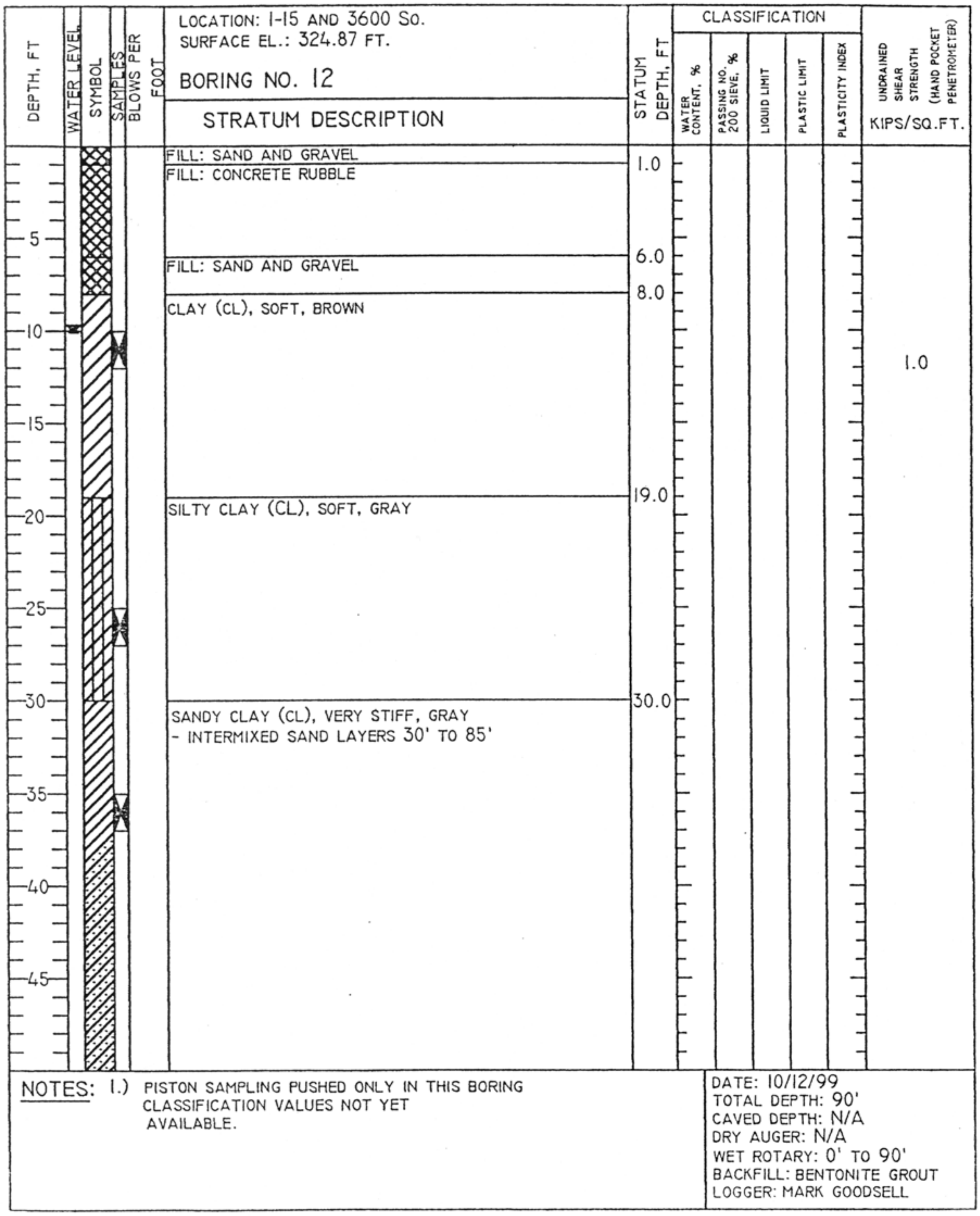


Figure 3.3. Log of boring No. I2.

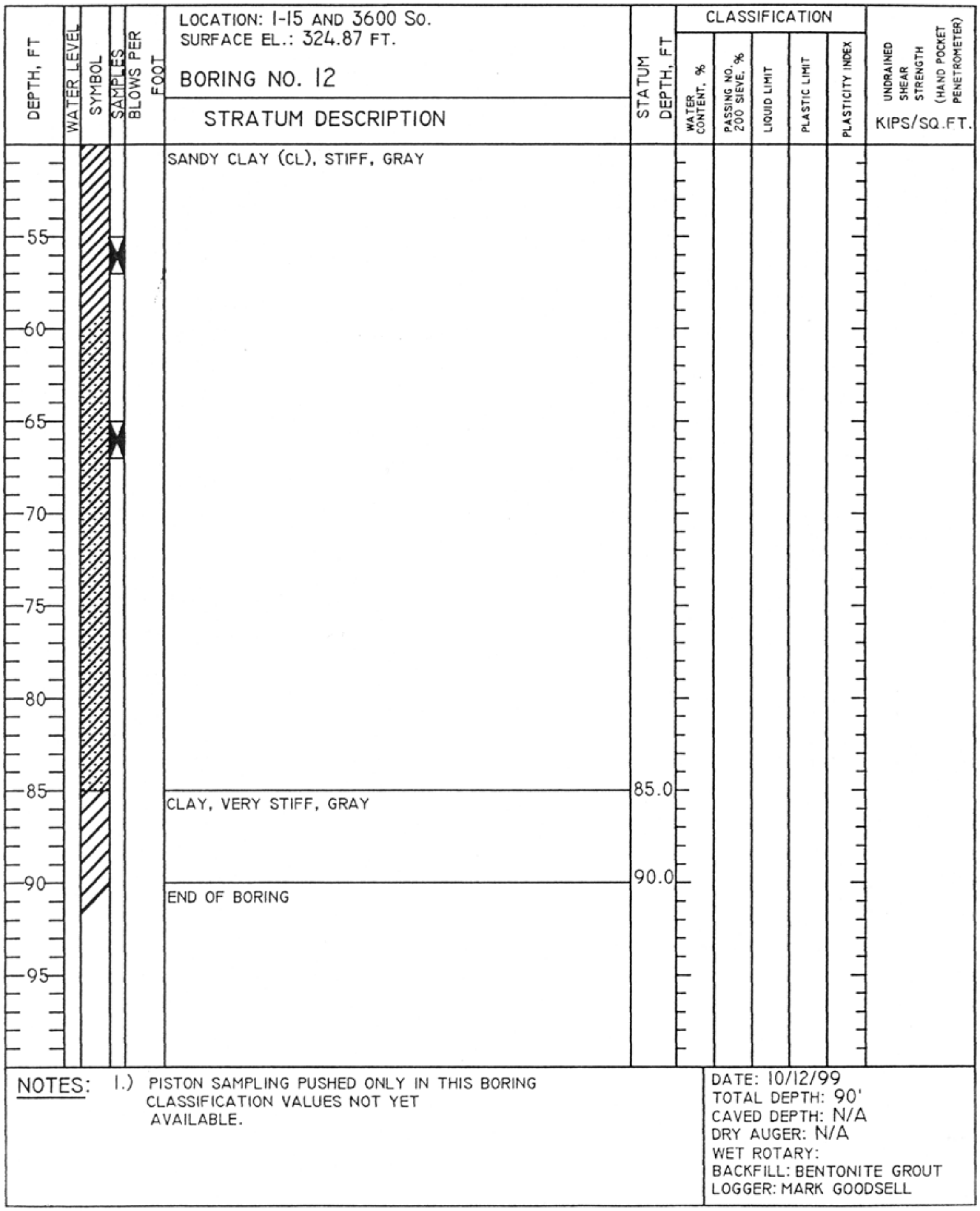


Figure 3.3. Log of boring No. I2 (continued).

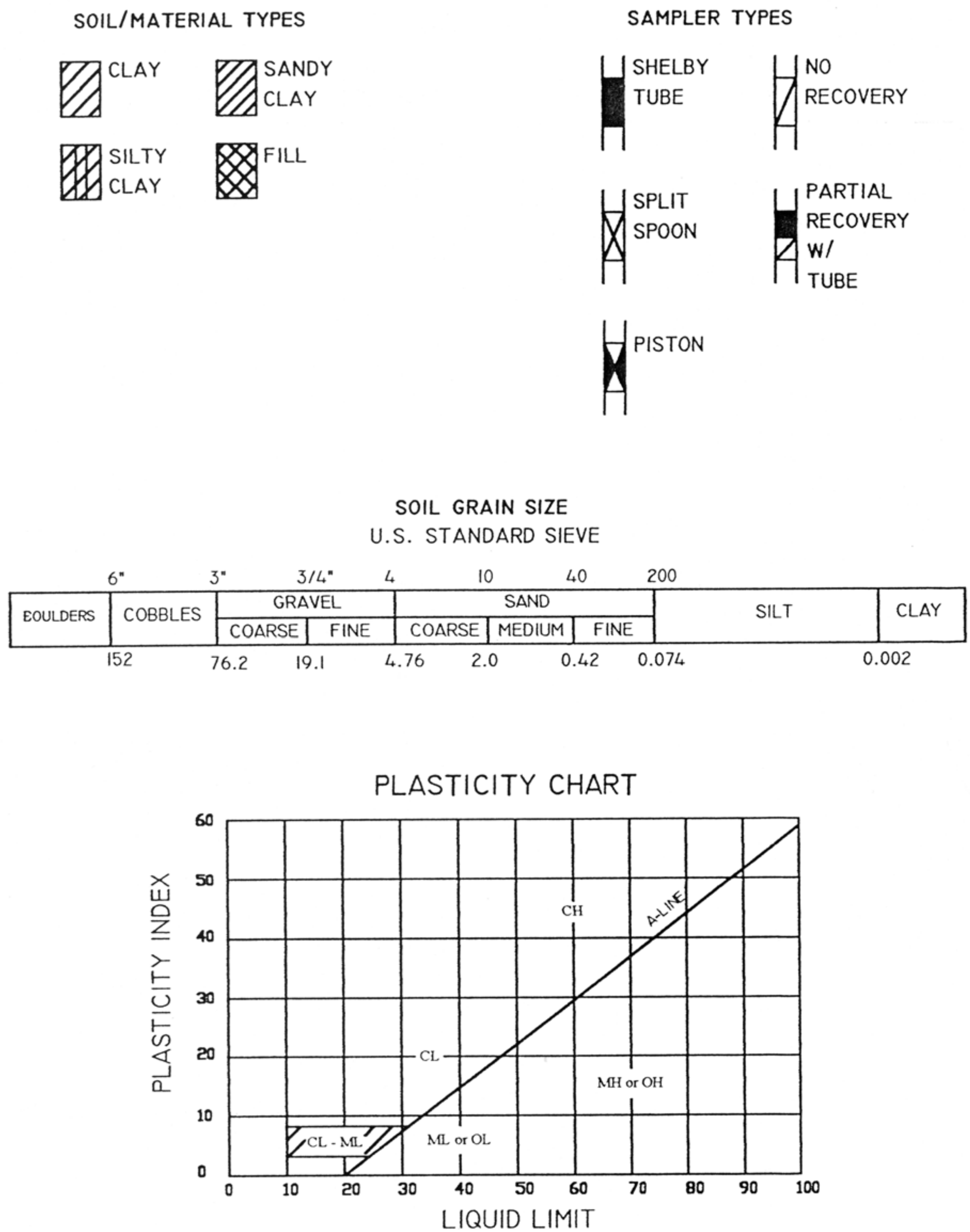


Figure 3.4. Description of symbols and charts used on boring logs.

3.1.2 Sampling Methods

Cohesive soil samples were obtained by hydraulically pushing a 3 inch (76.2 mm) diameter, thin-walled Shelby tube a distance of about 24 inches (0.61 m). The samples were capped with wax to contain the natural water content. All samples were transported to the Utah State University soils lab so further testing could be performed at a later date. Field estimates were obtained giving undrained shear strengths of the recovered samples using a hand penetrometer.

3.1.3 Borehole Completion

At the completion of each boring the appropriate instrument (inclinometer or Sondex Tube) was installed according to procedures outlined by the Slope Indicator Company. As mentioned, a borehole was installed using a wet rotary technique. The inclinometer and Sondex casings were then placed in their appropriate holes and oriented in the direction desired. For example, for the inclinometer casings, the grooves to guide the inclinometer were placed such that the pair of grooves lined up perpendicular to the MSE wall such that the inclinometer would take measurements both perpendicular to and parallel to the wall. Once the casings were in place and oriented in the proper direction, each boring was backfilled with cement-bentonite grout. The grout was placed in the boreholes by pumping from the bottom up using a tremie pipe.

3.2 Laboratory Testing

The laboratory testing for this report was intended for soil classification. The evaluation of the shear strength values has been determined as a portion of two additional reports also to be submitted. All laboratory tests were performed in accordance with ASTM standards and are tabulated in Table 3.1.

Table 3.1. Laboratory tests conducted for this study.

Laboratory Test	**Quantity**	**ASTM Standard**
Moisture Content	8	D 2216
Atterberg Limits	9	D 4318
Percent Passing 200 Sieve	10	D 421 & D 422
Particle-Size Analysis	1	D 421 & D 422
Standard Proctor Compaction	1	D 698

3.2.1 Classification Tests

Classification tests include test for natural moisture content, liquid and plastic limits (Atterberg Limits), and Percent Passing 200 Sieve. These tests aid in classifying soils, and are used to correlate the results of the tests performed on samples taken from Boring S2. The results of the classification tests are recorded in the appropriate columns on the boring logs.

3.2.2 Other Soil Classification Tests

Other soil classification tests performed were the particle-size analysis and Standard Proctor compaction test. The material that was used as backfill for Wall R-346-1C was a non-plastic, poorly-graded, coarse brown sand with only 3 percent finer than the No. 200 Sieve. Figure 3.5 gives the grain size distribution curve for the backfill sample collected. The moisture content-dry density relationship obtained from Standard Proctor compaction test is shown in Figure 3.6. Based on this plot, the maximum dry density was approximately 126 lb/ft^3 (19.8 kN/m^3) at an optimum water content of 10.5 percent.

3.3 General Site Conditions

3.3.1 Subsurface Conditions

Prior to construction of the wall, roughly 8 ft (2.44 m) of soil was excavated from the site as shown in Figure 3.7, and replaced with concrete rubble and granular fill as illustrated by Figure 3.8. Beneath this fill material was a soft layer of clay to a depth of 19 ft (5.79 m), which was overlying soft silty clay, which extended to a depth of 30 ft (9.14 m). Below a depth of 30 ft (9.14 m), the soils at the site consisted of stiff to very stiff sandy clay to a depth of 85 ft (25.9 m) below grade overlying clay to a depth of 90 ft (27.4 m), the maximum depth explored.

Based on a review of the field and laboratory tests performed on the soils encountered in the borings, the subsurface stratigraphy has been generalized into five primary strata. The five soil strata are summarized in Table 3.2.

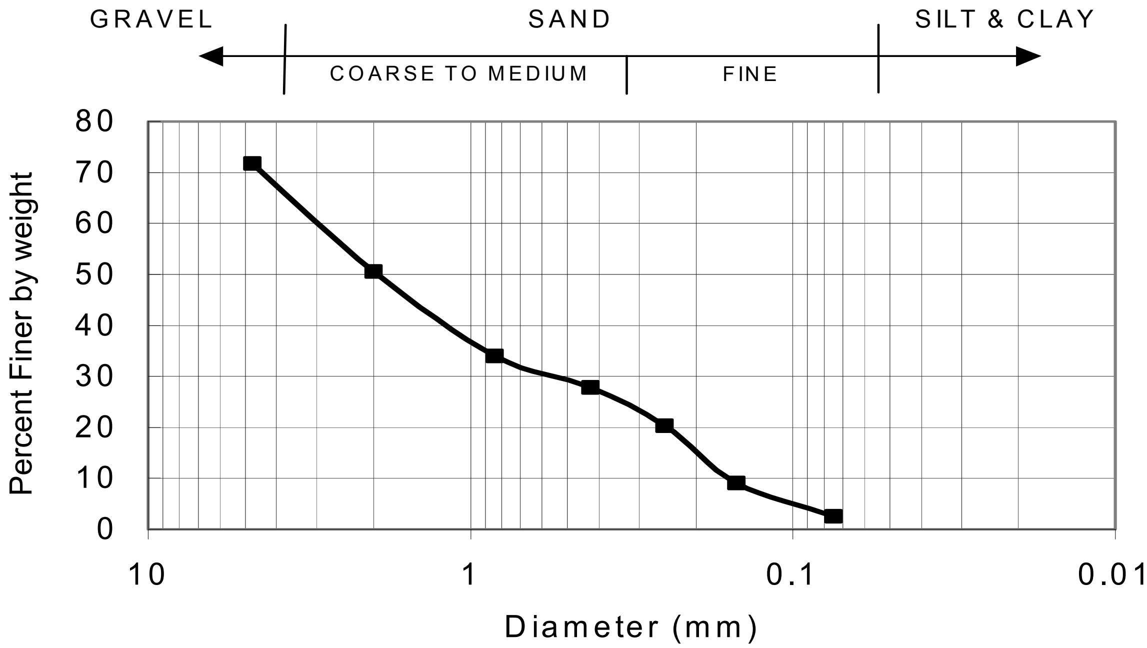


Figure 3.5. Grain-size distribution curves of the backfill material.

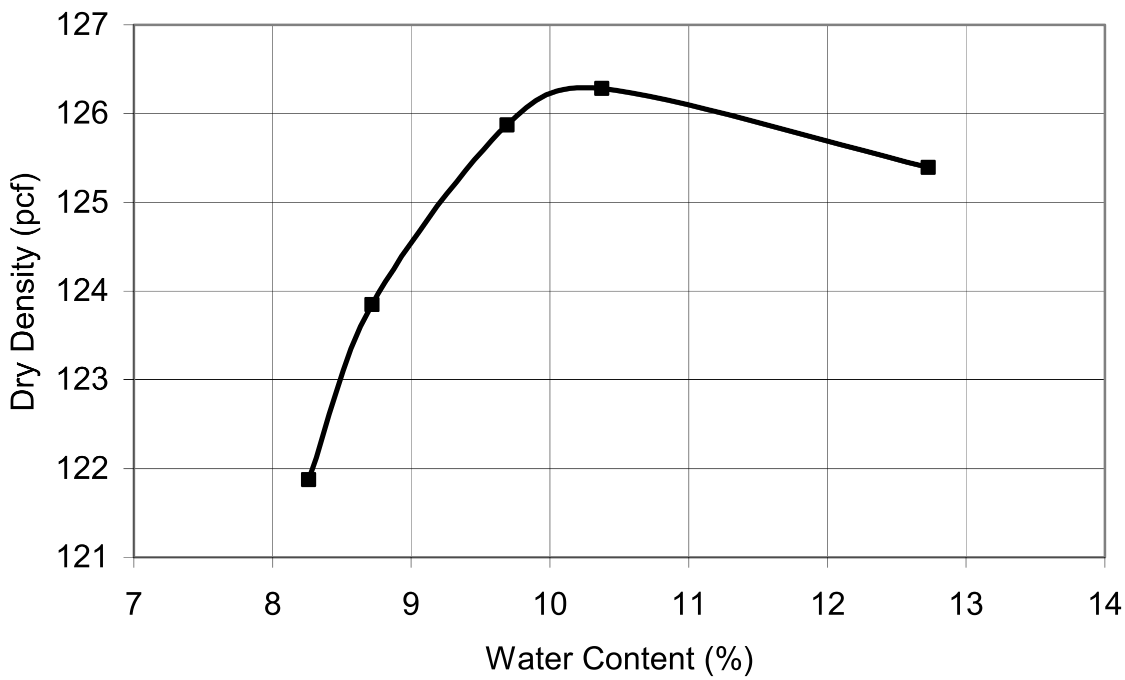


Figure 3.6. Water content-dry density relationship for the backfill material.

Figure 3.7. Photographs showing excavation of wall footprint prior to construction.

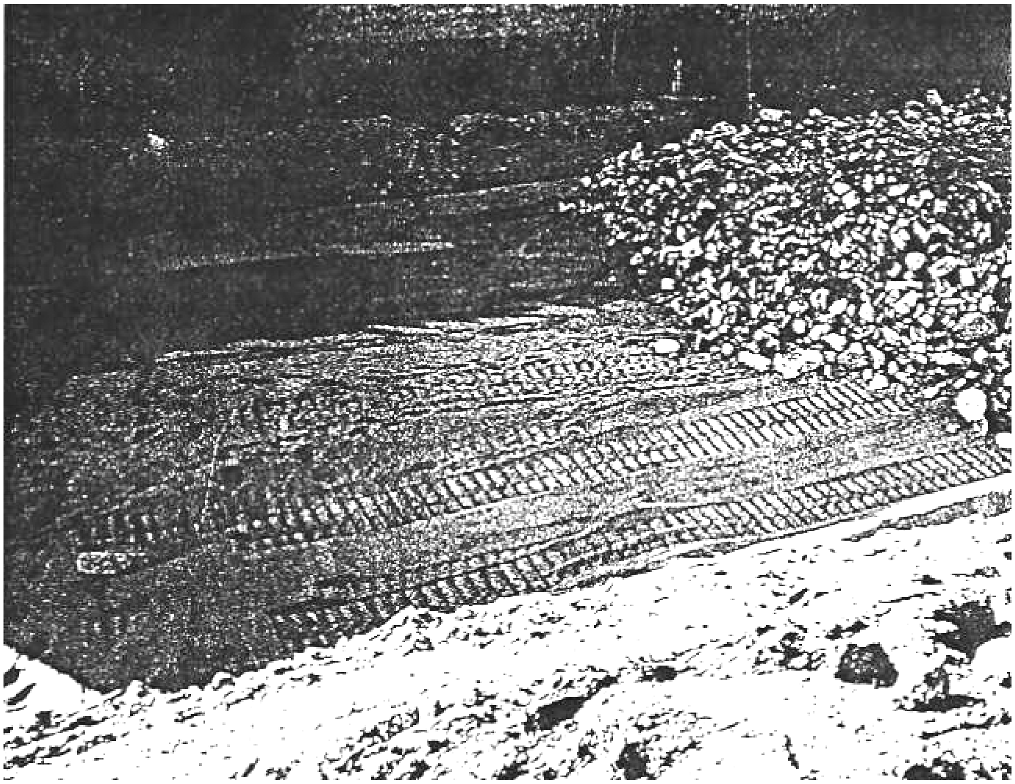


Figure 3.8. Photograph showing granular and concrete rubble fill being placed in the wall footprint prior to construction of the wall.

Table 3.2. Soil strata located at the site.

Stratum	**Material Description**	**Approximate Depth, ft**
I	Fill: Course Sand and Concrete Rubble	Surface to 8
II	Soft Clay	8 to 19
III	Soft Silty Clay	19 to 30
IV	Stiff to Hard Sandy Clay	30 to 85
V	Very Stiff to Hard Clay	85 to 90

Before construction of Wall R-346-1C, the old I-15 fill and about 6 ft (1.83 m) of natural clay soils were removed. Fill material (Stratum I) was placed in the excavation.

Stratum II is natural clay that extends to a depth of 19 ft (5.79 m) below grade. The Stratum II soils have a liquid limit of 50 and a plastic limit of 35 with a calculated plasticity index of 15. The natural moisture content for Stratum II is 65 percent. A pocket penetrometer was pushed in an undisturbed sample taken from a depth of 12 ft (3.66 m) below grade and yielded an estimated undrained shear strength of 500 lb/ft^2 (24 kN/m^2). The uncorrected blow count from a Standard Penetration Test (SPT) was 5 blows per foot (30 cm), which also indicated firm soil conditions.

Silty clay (Stratum III) was encountered below the Stratum II cohesive soils extending to a depth of about 30 ft (9.14 m) below grade. The Stratum III soils have liquid limits ranging from 32 to 33 and plastic limits ranging from 20 to 22. The calculated plasticity index ranges from 11 to 12. Moisture contents in the Stratum III soils range from 26 to 29 percent. These moisture contents may not reflect their natural state because disturbed samples were kept in Ziploc bags and some desiccation may have occurred. Uncorrected blow counts from SPT sampling at a depth of 25 ft (7.62 m) below grade were 5 blows per foot (30 cm).

Stratum IV consists of sandy clay that extends from 30 ft (9.14 m) to a depth of 85 ft (25.9 m). The Stratum IV soils have liquid limits ranging from 23 to 29 and plastic limits ranging from 15 to 23. The calculated plasticity index ranges from 4 to 9. Moisture contents in this stratum range from 21 to 37 percent. The estimated undrained shear strength range from about 1400 lb/ft^2 (67 kN/m^2) to 4500 lb/ft^2 (215 kN/m^2).

Uncorrected blow counts for Stratum IV ranges from 10 to greater than 50 blows per foot (30 cm).

Clays (Stratum V) were encountered below the Stratum IV soils extending to a depth of about 90 ft (27.4 m) below grade, the maximum depth explored. The liquid limit for this stratum was 45 and the plastic limit was 25 with a calculated plasticity index of 25. Uncorrected blow counts for Stratum V were 25 blows per foot (30 cm).

3.3.2 Groundwater Conditions

The wet rotary drilling method was used during borehole drilling, therefore the groundwater level was not able to be determined. However, after installation of the vertical inclinometers and Sondex tubes the water level stabilized allowing depth-to-water measurements to be made. Depth-to-water as read from S2 is about 6 ft (1.83 m) below grade. This water level has remained constant throughout readings in S2.

CHAPTER 4

FIELD INSTRUMENTATION PLAN FOR MSE WALL R-346-1C

4.1 Introduction

Construction on the I-15 corridor is complicated by the presence of soft clays, which underlie much of the project. To study and understand the actual field behavior of these MSE walls, an instrumentation program was carried out on wall R-346-1C located on the West side of I-15 and 3600 South. Two 30 ft (9.14 m) high sections of this wall were studied. One section of the instrumented wall contains primary reinforcement with intermediate reinforcement and the second section of instrumented wall contains only primary reinforcement. This chapter gives a description of the field instrumentation plan that was developed for this research project. The results of measurements made on the wall during construction are presented and discussed in Chapter 5.

4.2 Instrumentation to Measure Stresses

4.2.1 Lateral Earth Pressure Measurements

Reinforcement for this MSE wall consists of 13 layers of bar mats. Seven of the 13 layers were instrumented with strain gages, such that every other mat was instrumented. For each instrumented layer, 13 or 14 strain gage points were chosen for the primary reinforcement bar mats. Figure 4.1 shows the reinforcement bar mat located at level 1 in the wall with its strain gage configuration. Each bar mat had a different strain gage configuration depending on the locus of maximum tension, such that as many gages as possible were placed near the anticipated locus of maximum tension. Gage redundancy was also used in such sections, such that if a gage became nonfunctional, data would still be available from another gage at a similar position. Plan views for these different mats are shown in the Appendix in Figure A.1 though Figure A.17. For both sections of the wall with instrumentation, the primary bar mats have the same strain gage configuration at each level. It should be noted that the layer designations for the reinforcement are seen in Figure 4.12 and Figure 4.13. The "I" or "P" at the beginning of the layer designation denotes the sections containing primary and intermediate reinforcement, and primary reinforcement only, respectively. The number associated with the layer designation is the number of the layer of reinforcement, with layer 1 being the first layer of reinforcement instrumented. Thus, the layer given as PL3 is the third ***instrumented*** layer (from the bottom) of reinforcement in the section of the wall containing primary reinforcement only, which is actually the fifth layer of reinforcement from the bottom of the wall.

For the intermediate mats three out of six layers were instrumented with gages. For each intermediate instrumented layer, six to seven strain gage points were chosen. Figure 4.2 gives a plan view description of the gage configuration of intermediate mat at level 1.5. The two additional instrumented intermediate mats are shown in Appendix A.16 and A.17. For the W and W2 fascia panels, two strain gage points were chosen as shown in Figures 4.3 and 4.4. Such W and W2 panels can be seen in Figure 4.14 and Figure 4.15 as well.

For the primary, intermediate, and fascia panel bar mats, each instrumentation point consists of two strain gages that are glued opposite each other on the top and bottom of the longitudinal bars. Figure 4.5 depicts the schematic diagram of a typical instrumentation point. Figure 4.6 is a photograph of a strain gage attached to a bar mat.

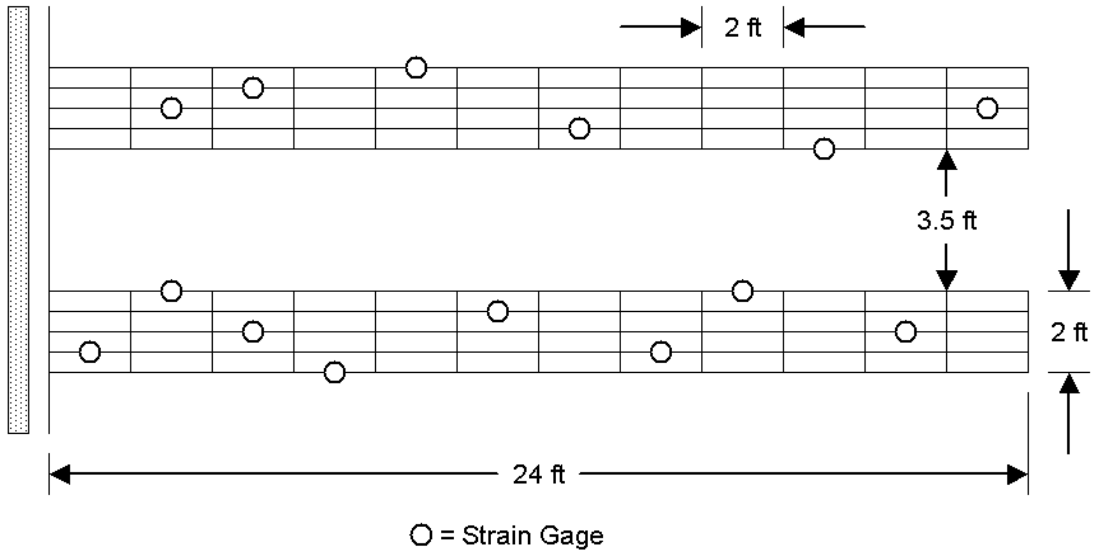


Figure 4.1. Plan view of instrumented bar mat 5W20-24 at level 1.

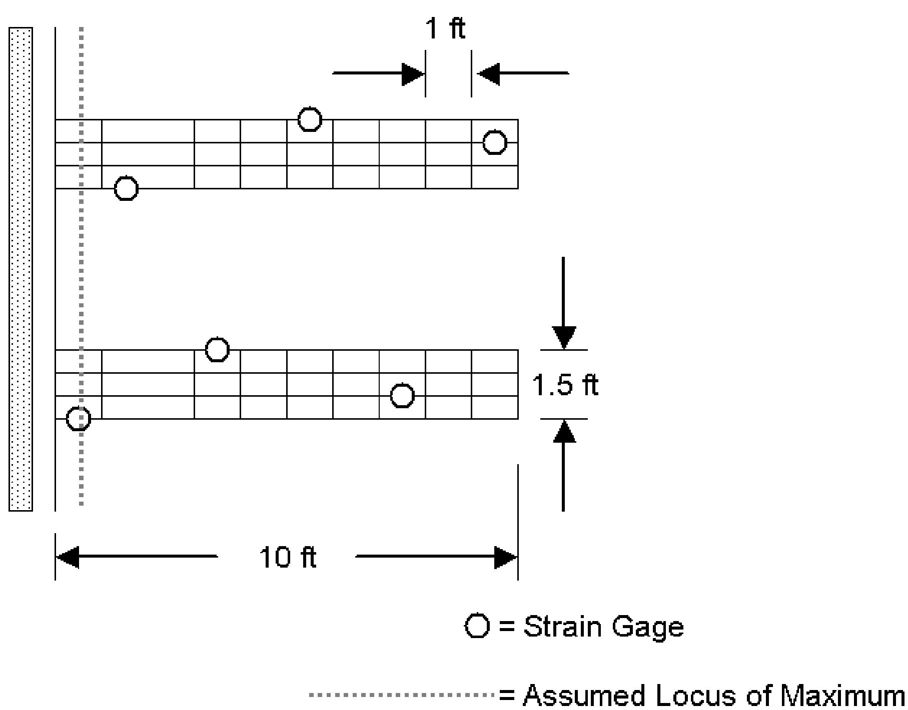


Figure 4.2. Plan view of instrumented intermediate bar mat 3W11-12 at level 1.5.

The gages for each instrumentation point were wired individually. However, the top and bottom gages were read in a full bridge format that causes bending stresses in the bar mats to cancel, thereby measuring the axial tension. Figure 4.7 gives a description of the full-bridge configuration. In the event that either the top or bottom gage became damaged the good gage was read in a half-bridge configuration shown by Figure 4.8. The bridge was completed in the multiplexer. A total of three different readings were required for each instrumentation point: a full bridge reading, a half bridge reading using the top strain gage, and a half bridge reading using the bottom strain gage. These configurations are shown in Figure 4.7 and Figure 4.8.

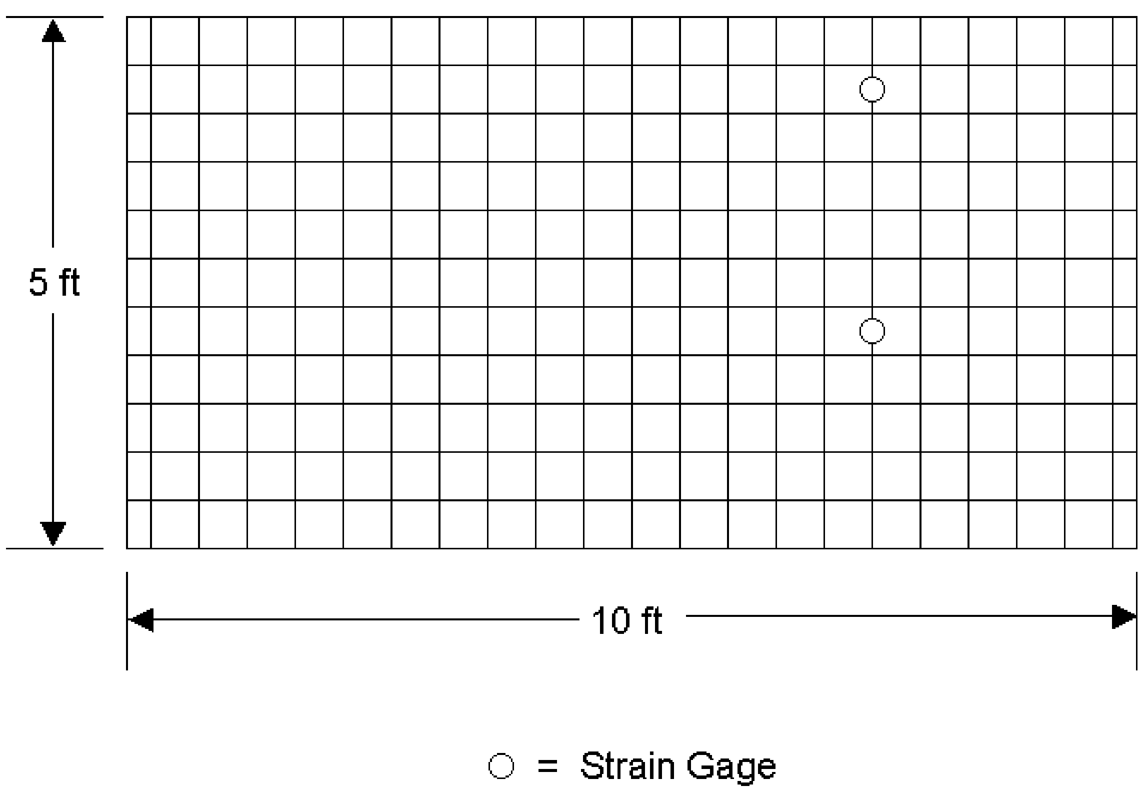


Figure 4.3. View of instrumented W fascia bar mat.

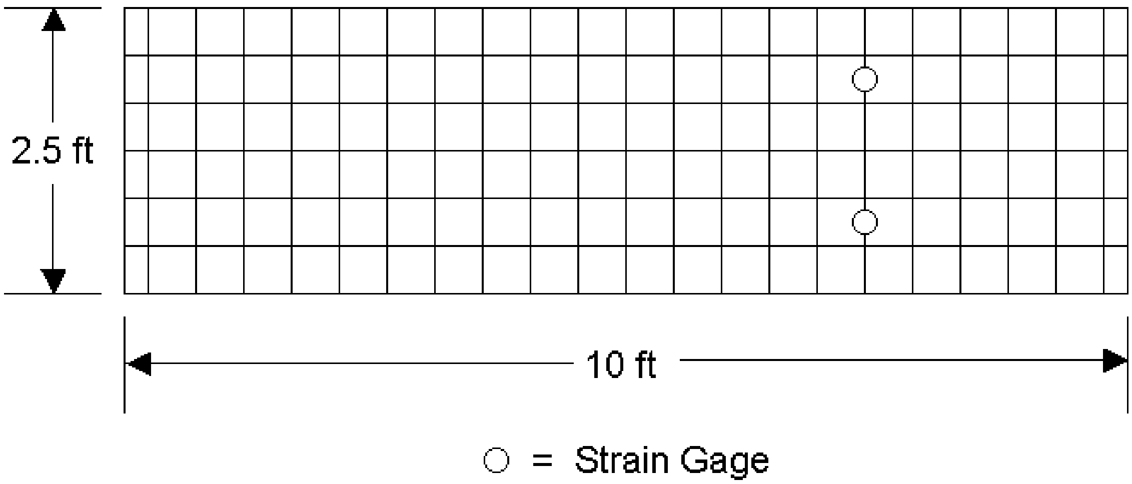


Figure 4.4. View of instrumented W2 fascia bar mat.

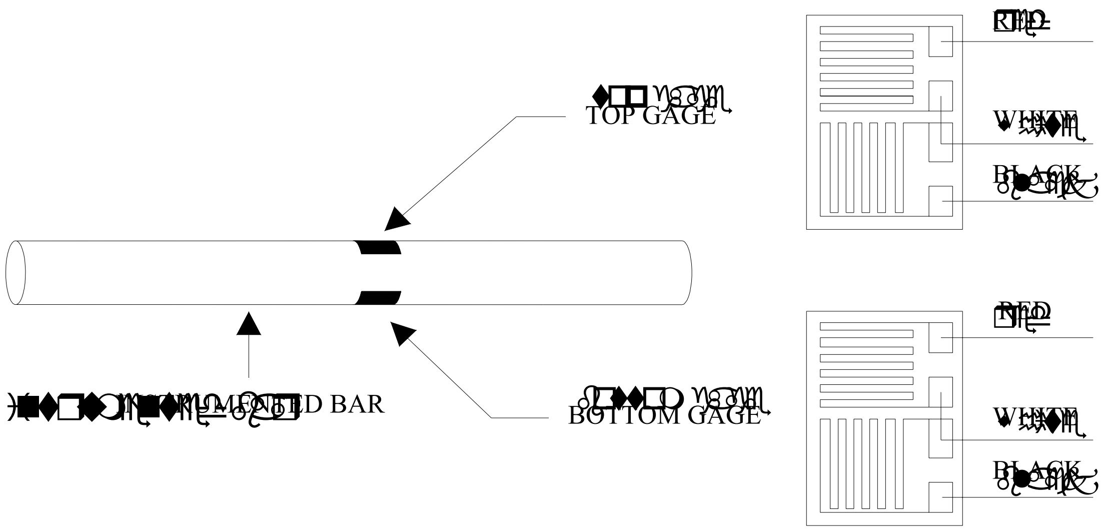


Figure 4.5. Wiring configuration of strain gages.

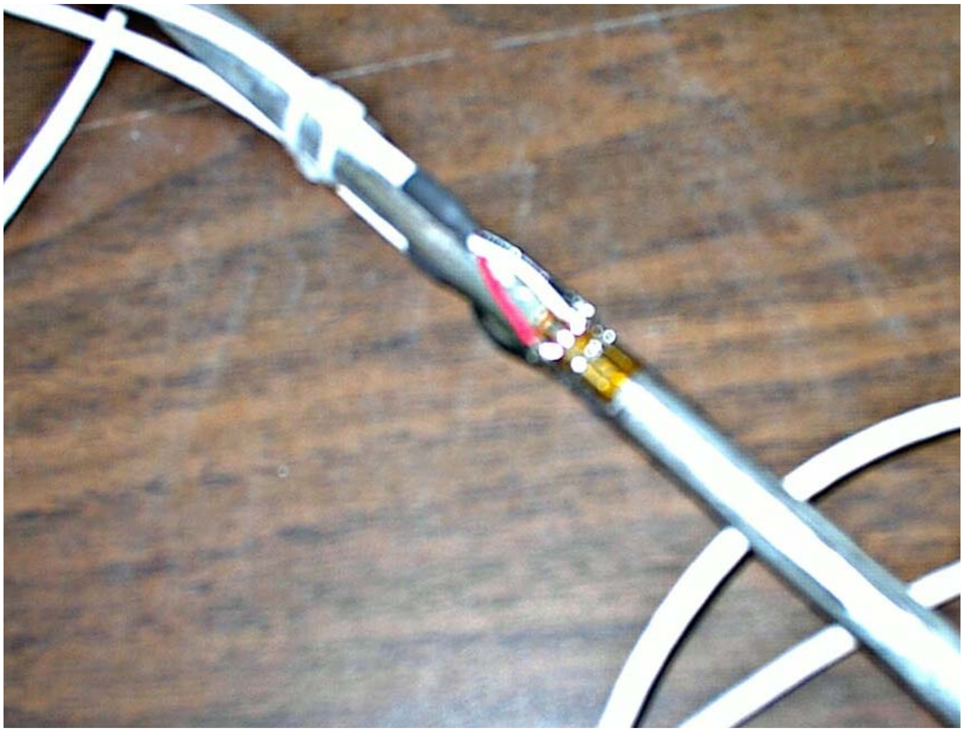


Figure 4.6. Photograph of a strain gage placed on a bar mat.

The gages used are manufactured by Micro-Measurements, Inc. and are of the type EA-06-125M-120. The gages are arranged such that a single matrix has two foil elements oriented perpendicular to one another. One of these elements measures the axial strain, while the other is used to monitor Poisson's effects. Such a dual gage provides for two specific benefits. First, having two gages in essentially the same position allows for temperature compensation to be made. Second, such gages have a higher sensitivity than those containing only a single element.

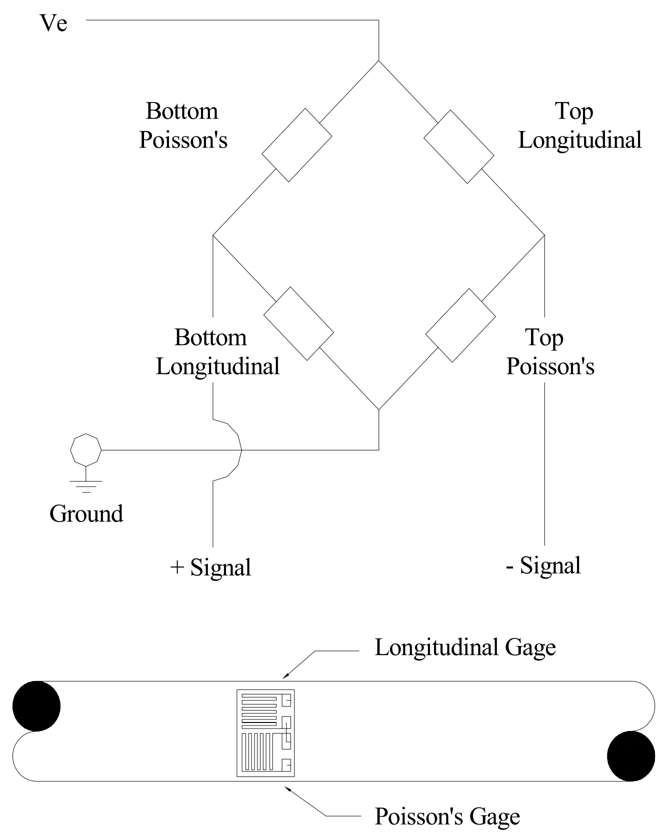


Figure 4.7. Full-bridge strain gage configuration.

After wiring, the gages were sealed with three layers of coating for protection from moisture and damage during construction. Figure 4.9 shows this protective coating covering strain gages on a bar mat prior to being covered with backfill. Each strain gage was first covered with a small strip of Teflon tape, and then a coating of air-drying solvent-thinned nitrile rubber. The solvent used to thin the nitrile rubber was Methal Ethal Ketone (MEK). This was applied to protect the lead wires on the gage. After the

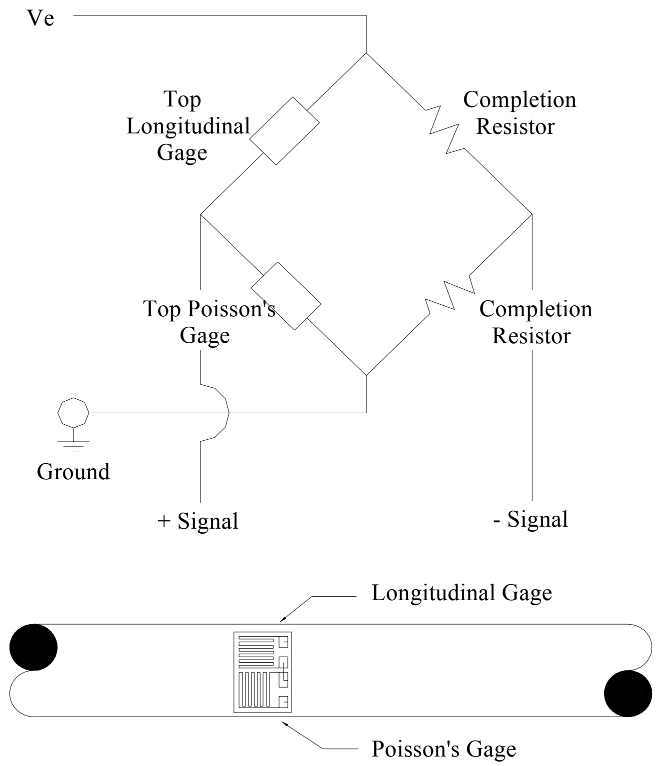


Figure 4.8. Half-bridge strain gage configuration.

thinned coating of nitrile rubber was applied, a non-thinned coating of nitrile rubber was used to cover the same area. The third coating that was applied was M-Coat J, which added extra strength against oil, grease, water, solvents, and most acids. Installation of the coatings was done according to instructions given by the Vishay Measurements Group (1995).

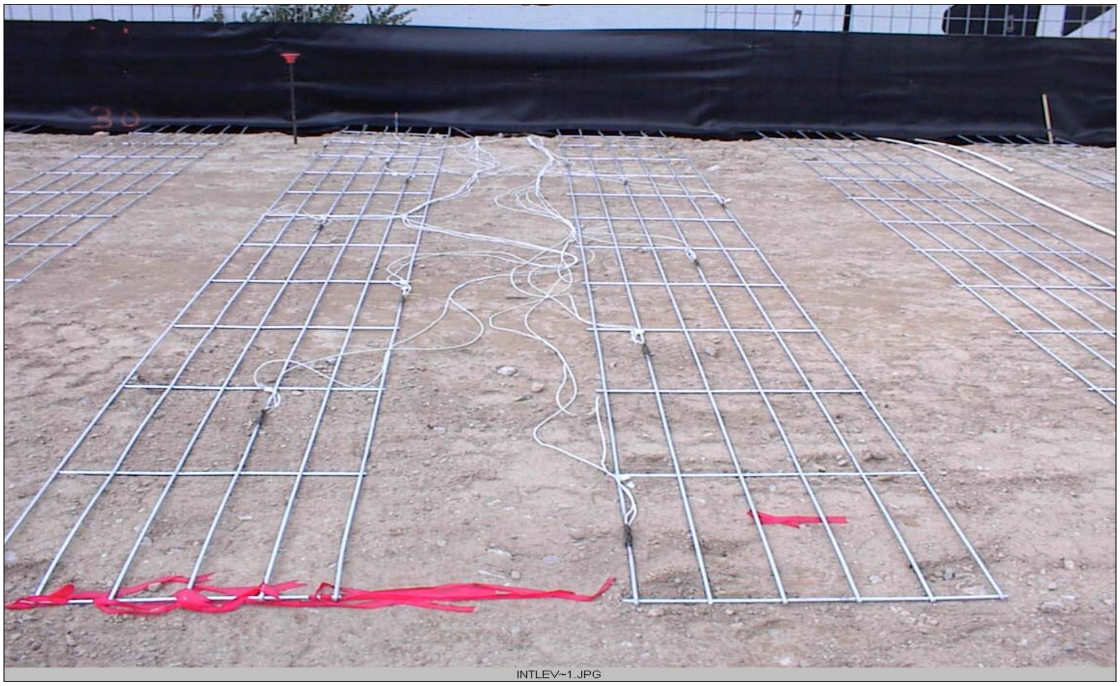


Figure 4.9. Photograph showing protective coating used to prevent moisture and construction damage.

The lead wires from the gages were bundled into four different sets for each instrumented layer. These bundled lead wires then exited the face of the wall and traveled through a 3 inch (76.2 mm) diameter Schedule 40 PVC pipe and exited the PVC pipe near the base of the wall as shown in Figure 4.10. Each set of wires was soldered to a connector, which could be quickly connected into the data acquisition system shown in Figure 4.11. The fascia panels were wired using the same method as was used on the primary and intermediate bar mats. However, the lead wires ran directly down the face of the wall and not through the 3 inch (76.2 mm) PVC pipe. This was done due to the lack of space inside the PVC pipe.

Figure 4.10. Photograph showing data acquisition system and exiting strain gage cables from PVC conduit.

Instrumentation of the reinforcing mats and facing panels took place during the months of September and October 1999 with a crew of seven or eight Utah State University students and one technician. The two locations of instrumented wall included 14 layers of primary reinforcement, three layers of intermediate reinforcement, 14 fascia panels, approximately 500 strain gages, and about 23,000 ft (7,000 m) of cabling.

The layout and location of the strain gage measurement points were decided based on the anticipated behavior in the field as well as on previous experiences with other instrumented walls (Sampaco, Anderson, and Robertson, 1994). The position of each of these strain gages is given in Appendix A. As mentioned, strain gages were placed in diametrically opposing positions on the top and bottom of the longitudinal bars for each instrumentation position on the bar mats. The instrumentation was designed in order to obtain sufficient information on the following relevant parameters:

(a) Determining the spatial variation in tension in the longitudinal wires, noting the variation as a function of the position with respect to the top of the wall as well as tension variation with respect to the distance from the face of the wall.

(b) Magnitude of axial tension in the longitudinal members of the fascia panel and tensile variation with respect to distance below the top of the wall.

(c) To determine the locus of maximum tension for the entire height of the wall.

(d) To maintain some redundancy in case of damage to gages or wiring during the course of the construction process.

As expected, a number of gages became nonfunctional during and after the construction process. Of the 215 gages initially placed on the longitudinal reinforcement, for example, only 96 gages were providing reasonable data at the end of construction, and additional gages have lost function since that time. This matter will be addressed further in subsequent sections.

Figure 4.11. Photograph of data acquisition system showing the 21X datalogger, AM416 multiplexer with enclosure, and the computer containing the Campbell-Scientific program used to take and store strain gage readings.

4.2.2 Description of the Instrumented Section with Primary and Intermediate Reinforcement

The instrumented section of Wall R-346-1C containing both primary and intermediate reinforcement consists of 13 primary reinforcing wire mat layers and six layers of intermediate reinforcing wire mats as shown in Figure 4.12. A typical primary reinforcement layer of wall consists of two wire mesh straps that range from 1.5 ft (0.46 m) to 2.5 ft (0.76 m) wide by 24 ft (7.32 m) long with a 5.5 ft (1.68 m) center-to-center lateral spacing. A typical intermediate layer consists of two 1.5 ft (0.46 m) wide by 10 ft (3.05 m) long wire mesh straps with the same lateral center-to-center spacing as the primary mats. These intermediate bar mats were placed between primary bar mats beginning at the bottom of the wall and placed intermittently within the wall up to a height that terminated 15 ft (4.57 m) below the top of the wall.

Each layer of reinforcement is connected to a 5 ft (1.52 m) by 10 ft (3.05 m) wire mesh fascia panel. Each bar mat consists of longitudinal wires, which vary in size from W20 (0.5 inch (12.7 mm) diameter) on the bottom layers to W11 (0.375 inch (9.525 mm) diameter) at the middle and topmost layers. These wires are spaced at 6 inches (152.4 mm) on centers and welded to W20 or W11 transverse wires depending on location within the height of the wall. These transverse wires are spaced 2 ft (0.61 m) center-to-center on the bottom layer and 1 ft (0.30 m) center-to-center on the topmost layers.

4.2.3 Description of the Instrumented Section with Primary Reinforcement Only

The instrumented section of Wall R-346-1C containing only primary reinforcement consists of 13 primary reinforcing bar mat layers with no intermediate bar mats present. Figure 4.13 shows an elevation of this particular section of instrumented wall, which was the original design done by the VSL Corporation. After construction of several MSE walls on the I-15 corridor bulging began to be noticed at the bottom of the wall facing. A design change was implemented to help correct this problem as outlined in section 4.2.2.

Only a relatively small section of this wall was constructed using only primary reinforcement. The two instrumented mats for each instrumented layer had two sections also constructed with only primary reinforcement on either side, such that boundary effects due to the intermediate reinforcement would be minimal. Thus, a section of the wall approximately 33 ft (10.1 m) long had only primary reinforcement, while the remainder of the wall had both primary and secondary reinforcement.

Labels were designated for the strain gages according to the position of the bar mats they were attached to within the wall. For example, a gage positioned on the bar mat given as IL1 would be attached to the bar mat in the section of the wall with both Intermediate (I) and Primary reinforcement in Layer 1 (L1) of reinforcement. Similarly, a gage on mat PL3 would be attached to the bar mat with Primary reinforcement only (P) in Layer 3 (L3) of reinforcement. These labels are given in Figure 4.12 and Figure 4.13.

4.2.4 Description of the Fascia Bar Mats

Both instrumented sections of Wall R-346-1C have two types of wire bar mats; the W panel illustrated in Figure 4.14 is 5 ft (1.52 m) tall by 10 ft (3.05 m) wide and the W2 bar mat shown in Figure 4.15 is 2.5 ft (0.76 m) tall by 10 ft (3.05 m) wide. The W2 bar mat is basically a bent W bar mat as shown in Figure 4.15. The longitudinal and transverse wires on the bar mats are spaced 6 inches (152.4 mm) center-to-center. The fascia bar mats are overlapped 6 inches (152.4 mm) at the top and bottom and overlapped 3 inches (76.2 mm) on either side of the panel. These panels are connected together with baling wire.

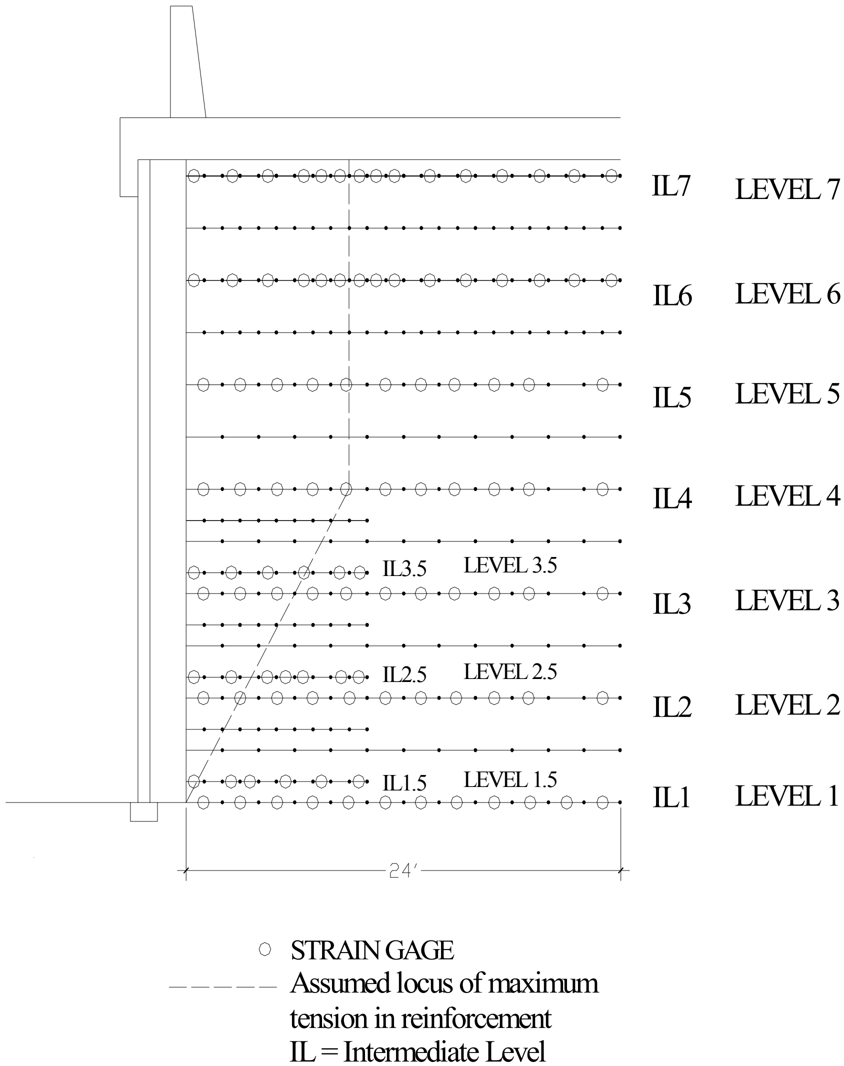


Figure 4.12. Elevation view of the Wall R-346-1C with primary and intermediate reinforcement.

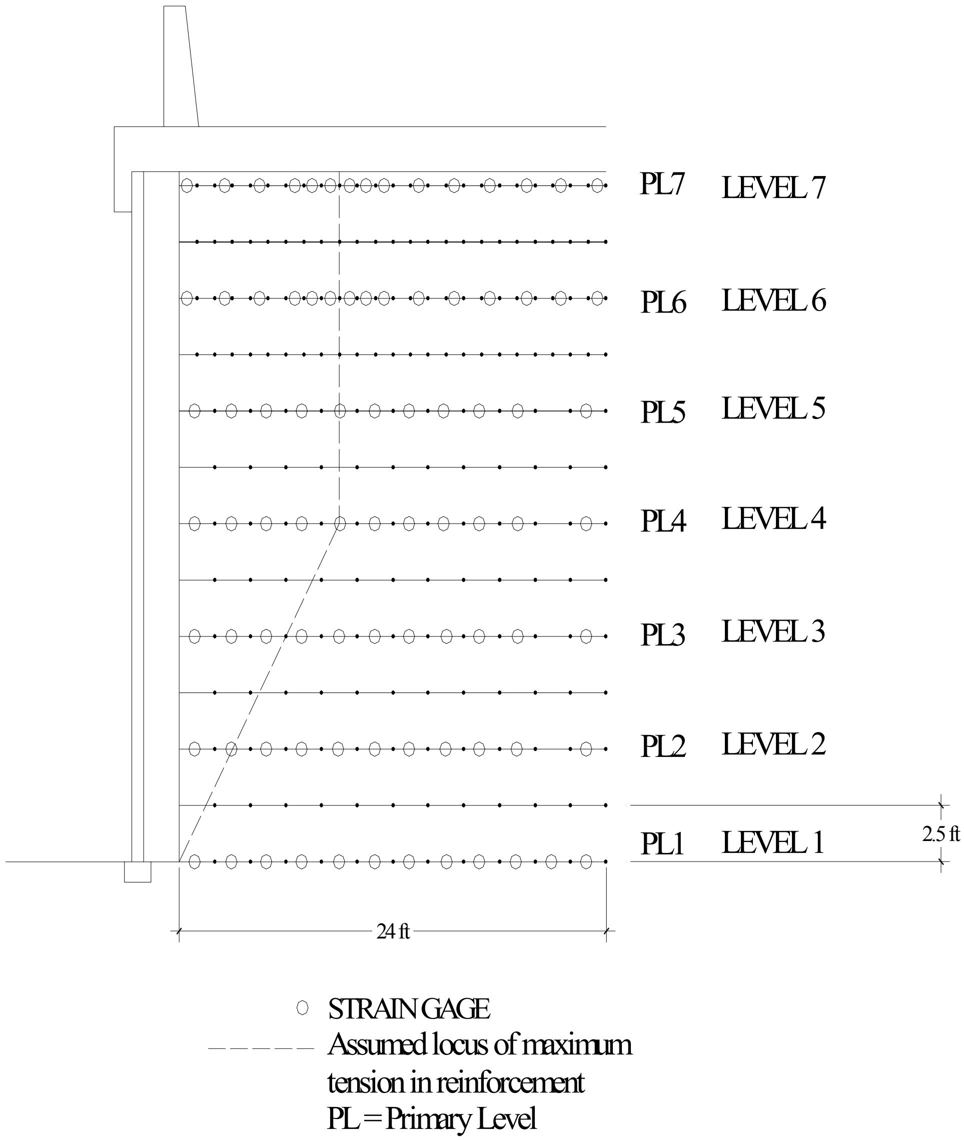


Figure 4.13. Elevation view of Wall R-346-1C with primary reinforcement only.

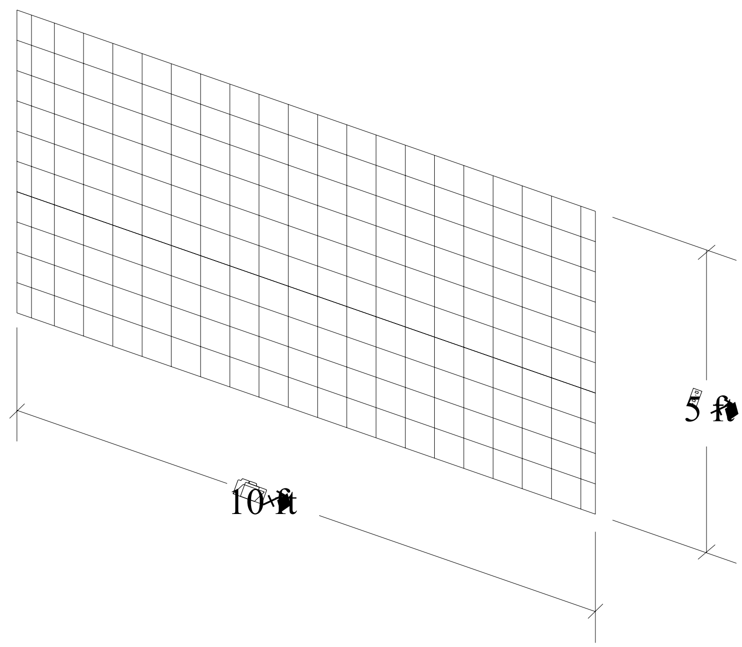


Figure 4.14. Wire mesh W fascia mat.

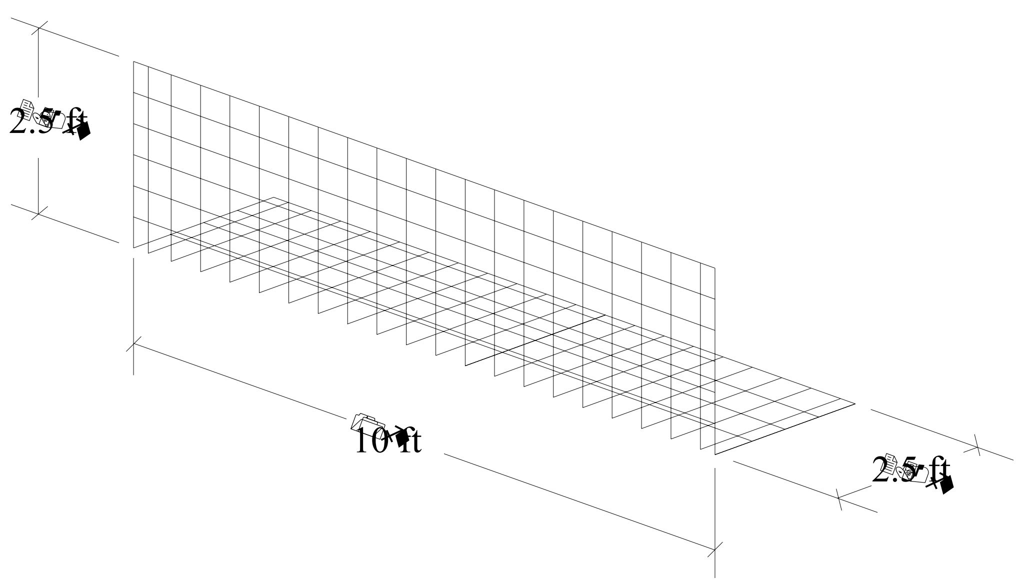


Figure 4.15. Wire mesh W2 fascia mat.

4.2.5 Total Pressure Cells

To measure the overburden pressure within the wall, five 9 inch (228.6 mm) diameter SINCO vibrating wire total pressure cells were installed at a fill height of about 6 ft (1.83 m) shown by Figure 4.16. These pressure cells were placed in the primary reinforcing only section of the wall between layer PL2 and the un-instrumented layer above layer PL2. This allowed the instrumentation cables to be very near the cables connected to the bar mat strain gages in the primary reinforced only section of the wall. The five pressure cells were aligned as illustrated in Figure 4.17.

The SINCO total pressure cell is a 9 inch (228.6 mm) diameter by 0.43 inch (10.92 mm) thick stainless steel cell and weighs about 8 lb. (35.6 N). The disk shaped cell is filled with oil, and total stress in the soil is transferred to the oil through the flexible faces of the disk. A vibrating wire pressure transducer is used to measure the oil pressure in the cell. The pressure transducers that are being used in this wall have a working pressure range of 1 to 50 psi (6.89 to 344.7 kPa). Installation of the pressure cells followed the procedure suggested by the Slope Indicator Company (SINCO, 1998). Figure 4.18 shows the pressure cell located 30 ft (9.14 m) from the face prior to burial.

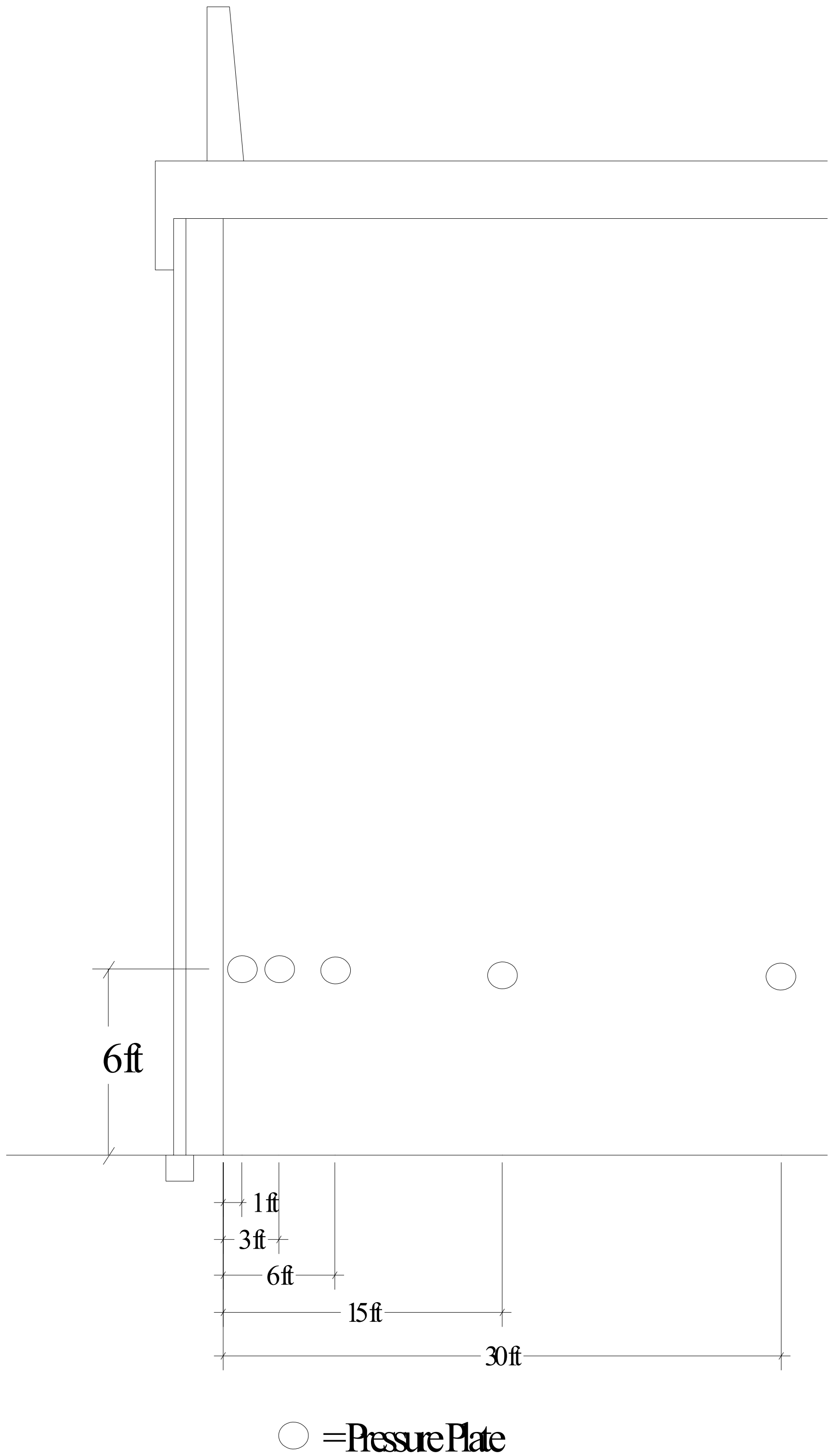


Figure 4.16. Elevation view of the instrumented section with total pressure cells.

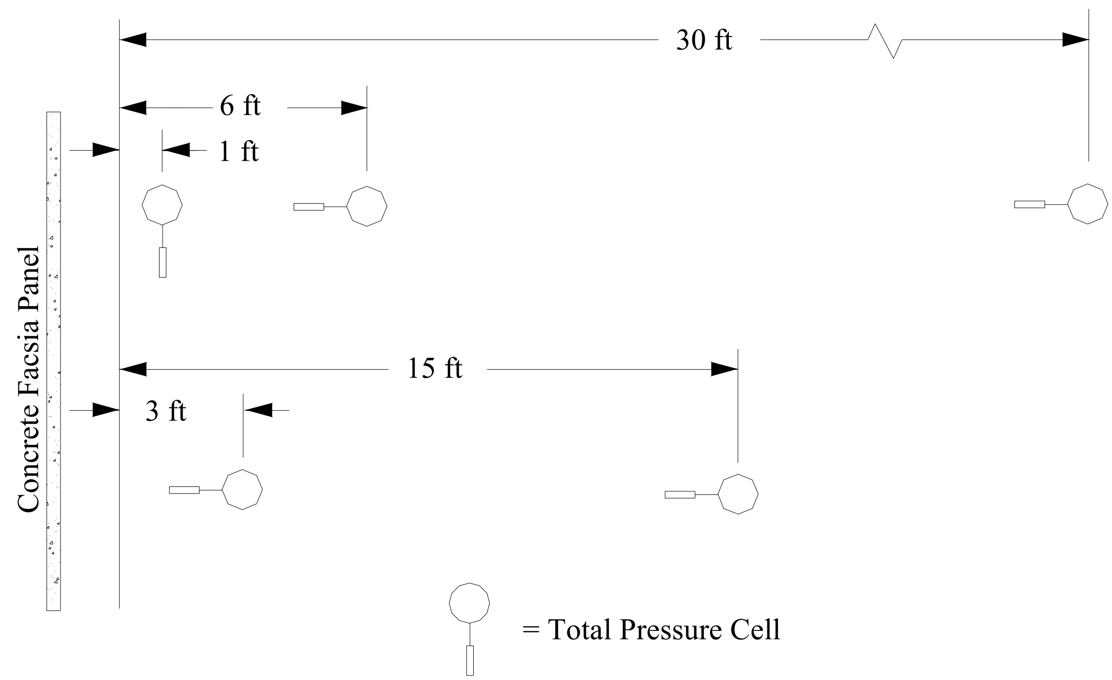


Figure 4.17. Plan view of the instrumented section with total pressure cells.

Figure 4.18. Photograph showing an installed total pressure cell before burial.

4.3 Instrumentation to Measure Deformations

4.3.1 Description of Horizontal and Vertical Inclinometers

To measure horizontal movement within the walls soft foundation soils, three vertical slope inclinometers were installed to a depth of 90 ft (27.4 m) in order to penetrate the soft clay deposits. The vertical inclinometers were installed in a linear array shown in Figures 4.19. Figure 4.20 gives an elevation view of both vertical and horizontal inclinometers as they are positioned within the wall and subsurface soils. The inclinometers are identified as I1, I2, and I3.

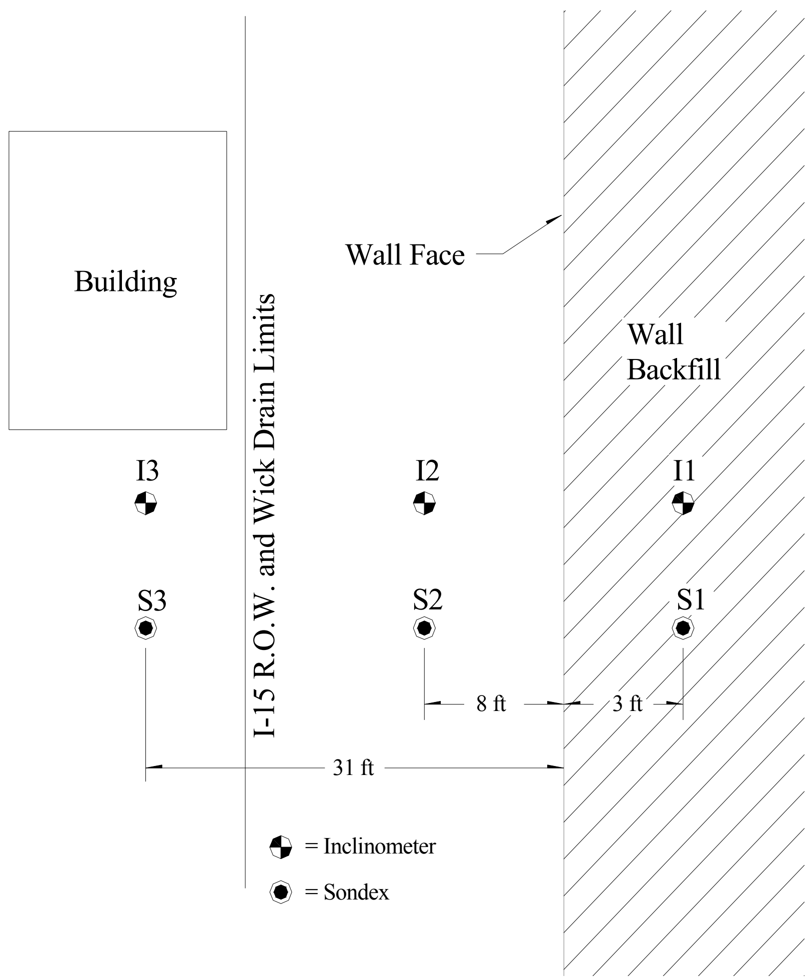


Figure 4.19. Plan view of vertical inclinometers, I1, I2, and I3 (Also shown Sondex tubes, S1, S2, and S3).

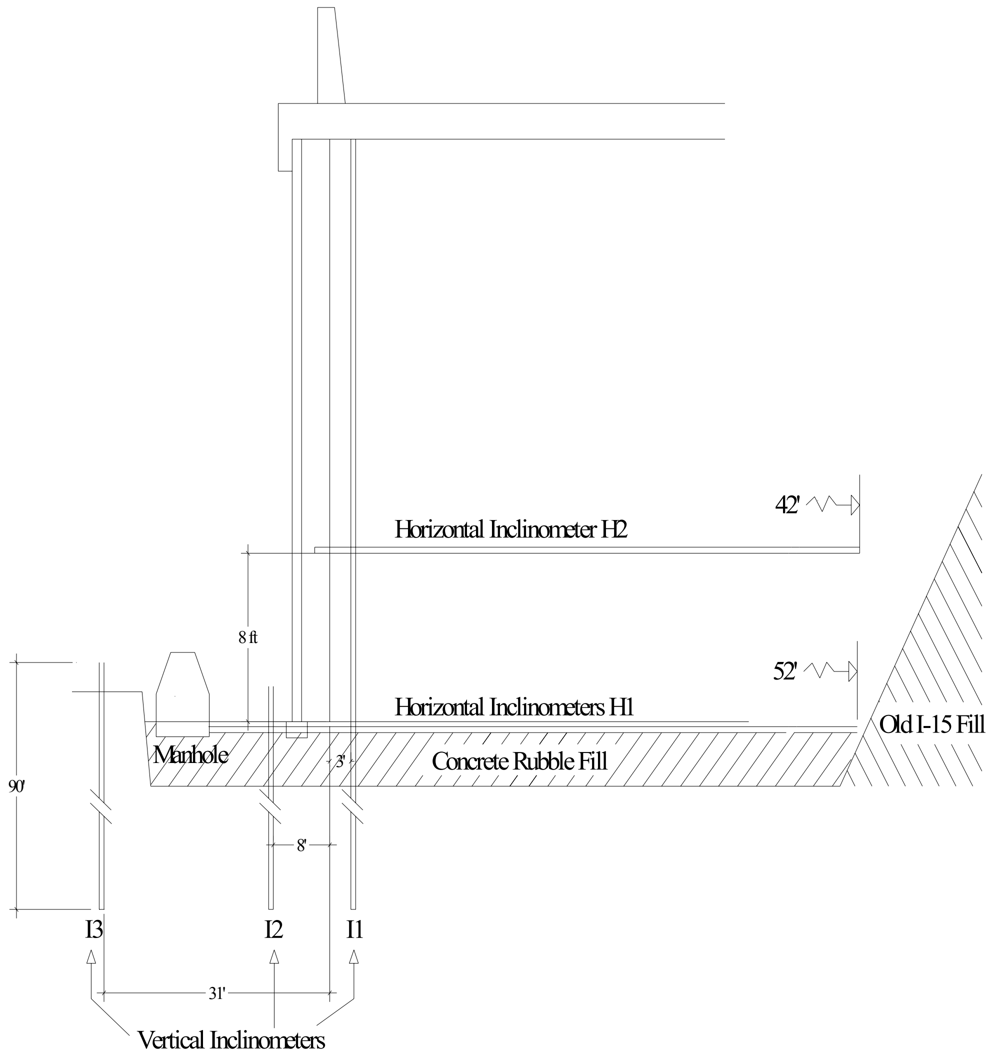


Figure 4.20. Elevation view of the vertical and horizontal inclinometer section of Wall R-346-1C.

Inclinometer No. 1 (I1) was installed inside the wall footprint and is inside the wick drain boundary zone. Inclinometer No. 2 (I2) was installed 8 ft (2.44 m) away from the bar mat fascia face of the wall and it is also located within the wick drain boundary zone. Inclinometer No. 3 (I3) was installed 31 ft (9.45 m) away from the face of the wall and it is located about 9 ft (2.74 m) outside the wick boundary zone. Since I1 was installed within the footprint of the wall, inclinometer casing was added as the wall fill height increased.

Two 3.75 inch (95.25 mm) diameter horizontal inclinometers were installed in the foundation of the wall and within the wall fill. Horizontal inclinometer H1 is several feet below grade and requires a manhole for access. It extends 52 ft (15.8 m) through the foundation fill material. Figure 4.21 shows a reading being taken on H1 from inside the manhole. Horizontal inclinometer H2 is located within the wall fill, originates at the wall face as shown by Figure 4.22, and extends 42 ft (12.8 m) into the wall fill. Installation of these horizontal inclinometers was done with the assistance of Terracon, a geotechnical engineering consulting firm.

4.3.2 Description of Horizontal Extensometers

Measurement of horizontal movement at various depths within the wall fill was done with 60 horizontal extensometers. These extensometers range in length and identify any movement that may exist at their respective distances back into the wall as shown in Figure 4.23. The lengths of the extensometers are 1 ft, 2 ft, 4 ft, 8 ft, and 16 ft (305 mm, 610 mm, 1.22 m, 2.44 m, and 4.88 m., respectively). These extensometers were built in the lab at Utah State University and consist of 0.5 inch (12.7 mm) schedule 40 PVC pipe and a 0.187 inch (4.75 mm) steel rod illustrated in Figure 4.24. A hook was bent in the steel bar at one end so a plumb bob could be hung to measure any horizontal movement. At the opposite end of the steel bar a small piece of steel bar was welded perpendicular to the main isolated steel bar. Before welding, the main piece of steel bar was threaded through the PVC pipe and capped with 0.5 inch (12.7 mm) PVC end caps to prevent soil from entering the pipe. Figure 4.25 is a photograph showing the horizontal extensometers protruding out of the face of the wall.

Figure 4.21. Photograph showing the inside of the manhole where horizontal inclinometer No.1 (H1) is located.

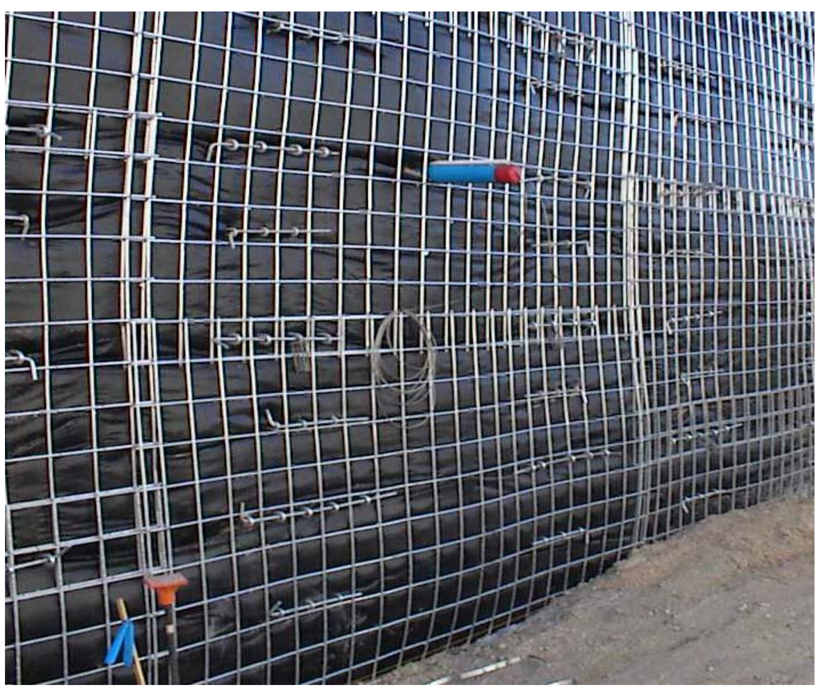


Figure 4.22. Photograph of horizontal inclinometer No. 2 (H2).

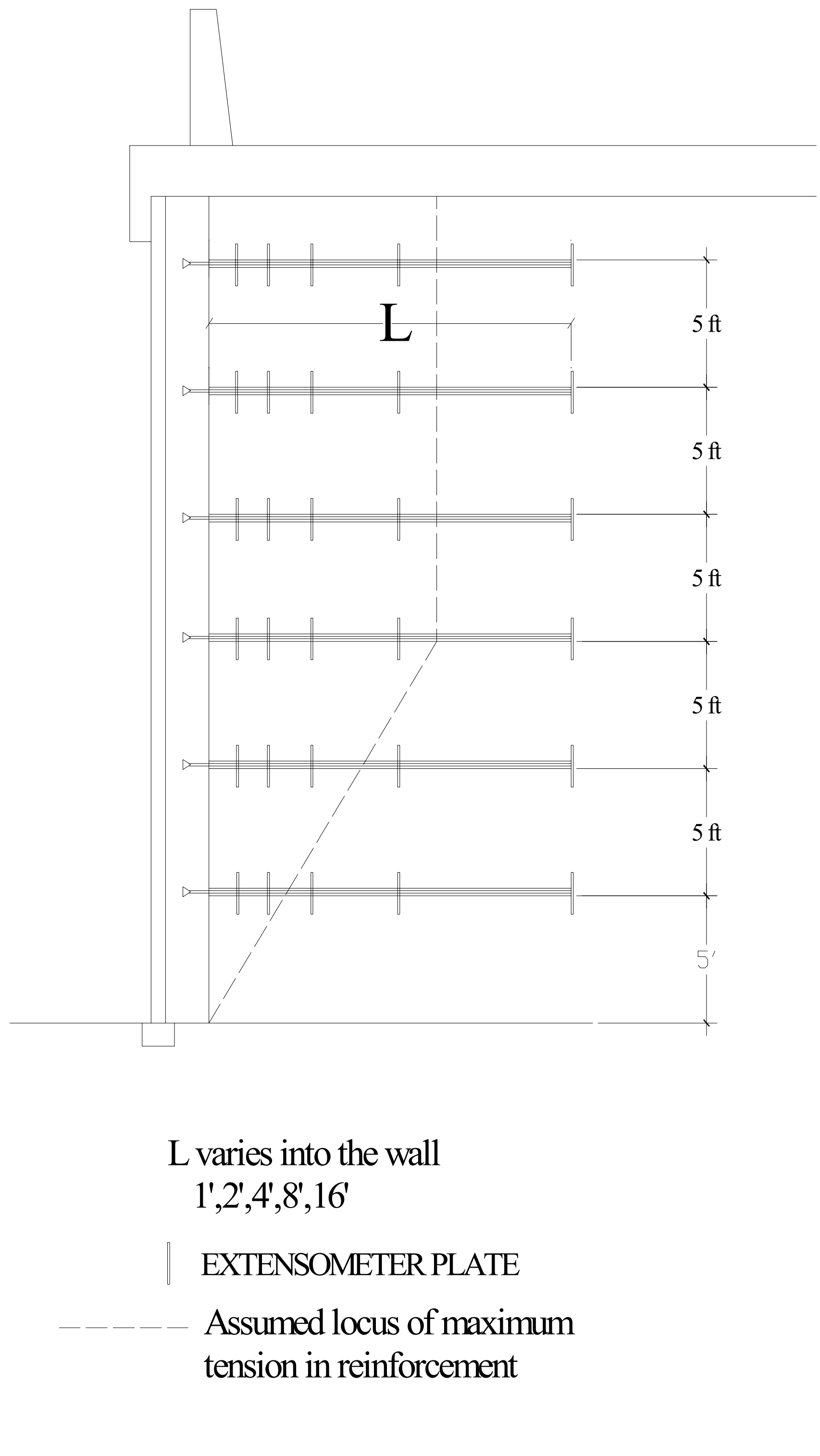
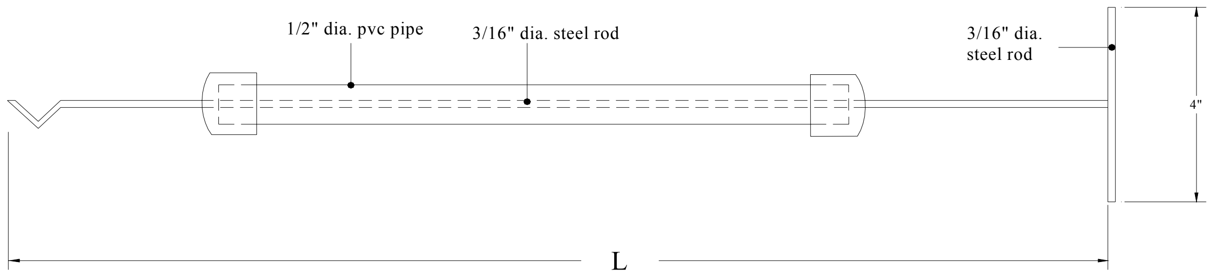


Figure 4.23. Elevation view of the instrumented section with horizontal extensometers.



L varies 1',2',4',8',16'

Figure 4.24. Plan view showing the design of a horizontal extensometer.

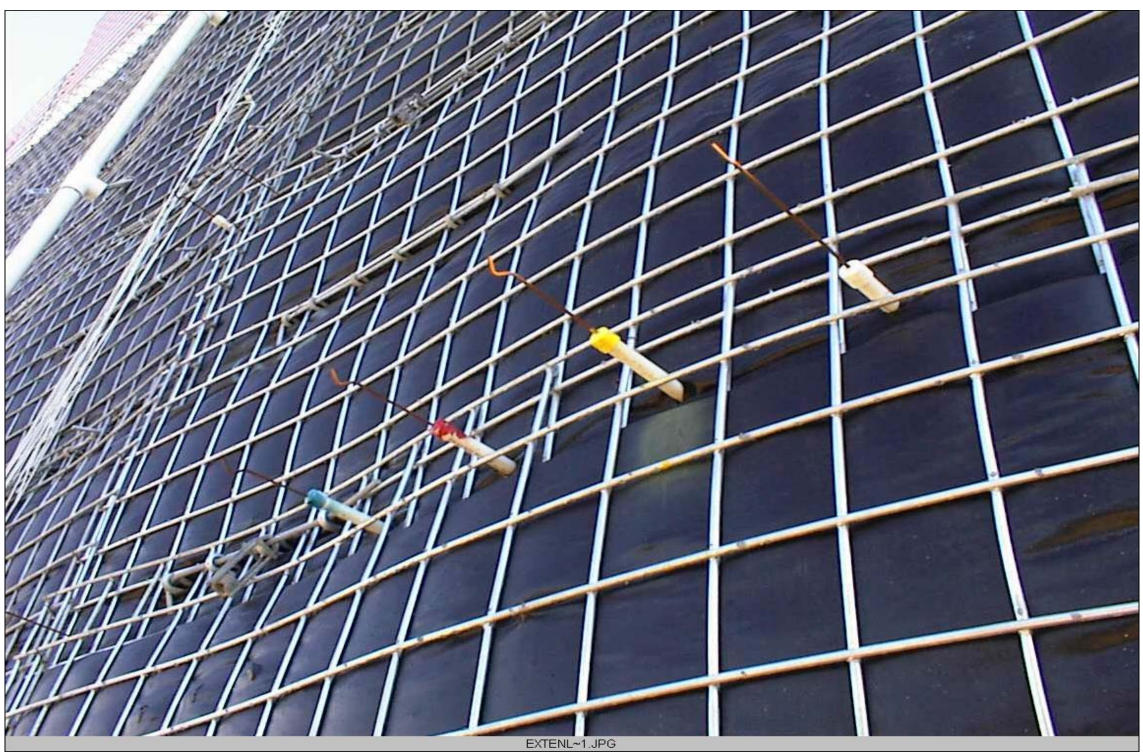


Figure 4.25. Photograph showing horizontal extensometers protruding from wall face.

4.3.3 Description of Sondex Settlement System

The Sondex Settlement System was used to monitor total settlement and the depths at which incremental settlement occurs. Sondex instruments were installed adjacent to the vertical inclinometers previously shown in Figure 4.20. The Sondex instruments are identified as S1, S2, and S3. Sondex instruments S1 and S2 are located adjacent I1 and I2, respectively, and they are both located within the wick drain zone, which extends to the I-15 right-of-way. Sondex instrument S3 is adjacent to I3 and it is located about 9 ft (2.74 m) outside the wick drain zone.

Three Sondex settlement tubes were installed to a depth of 90 ft (27.4 m) by a truck-mounted drill as illustrated by Figure 4.26. The Sondex settlement system involves several components: a reel with stainless steel sensing rings, corrugated pipe, and 2.75 inch (69.85 mm) SINCO casing. As shown in Figure 4.27, the Sondex probe is lowered inside the 2.75 inch (69.85 mm) casing, which is encased by the corrugated pipe, which in turn has a number of stainless steel sensing rings that have been vertically positioned prior to installation every 3 ft (0.914 m) along the casing. In the soft foundation soils the sensing rings are fixed to the continuous length of compressible corrugated pipe, which slips along the 2.75 inch (69.85 mm) casing and allows the rings to move with the surrounding ground. These Sondex rings are allowed to move independently of one another. Installation of the Sondex Settlement System was done in accordance with suggestions given by the Slope Indicator Company (SINCO, 1998).

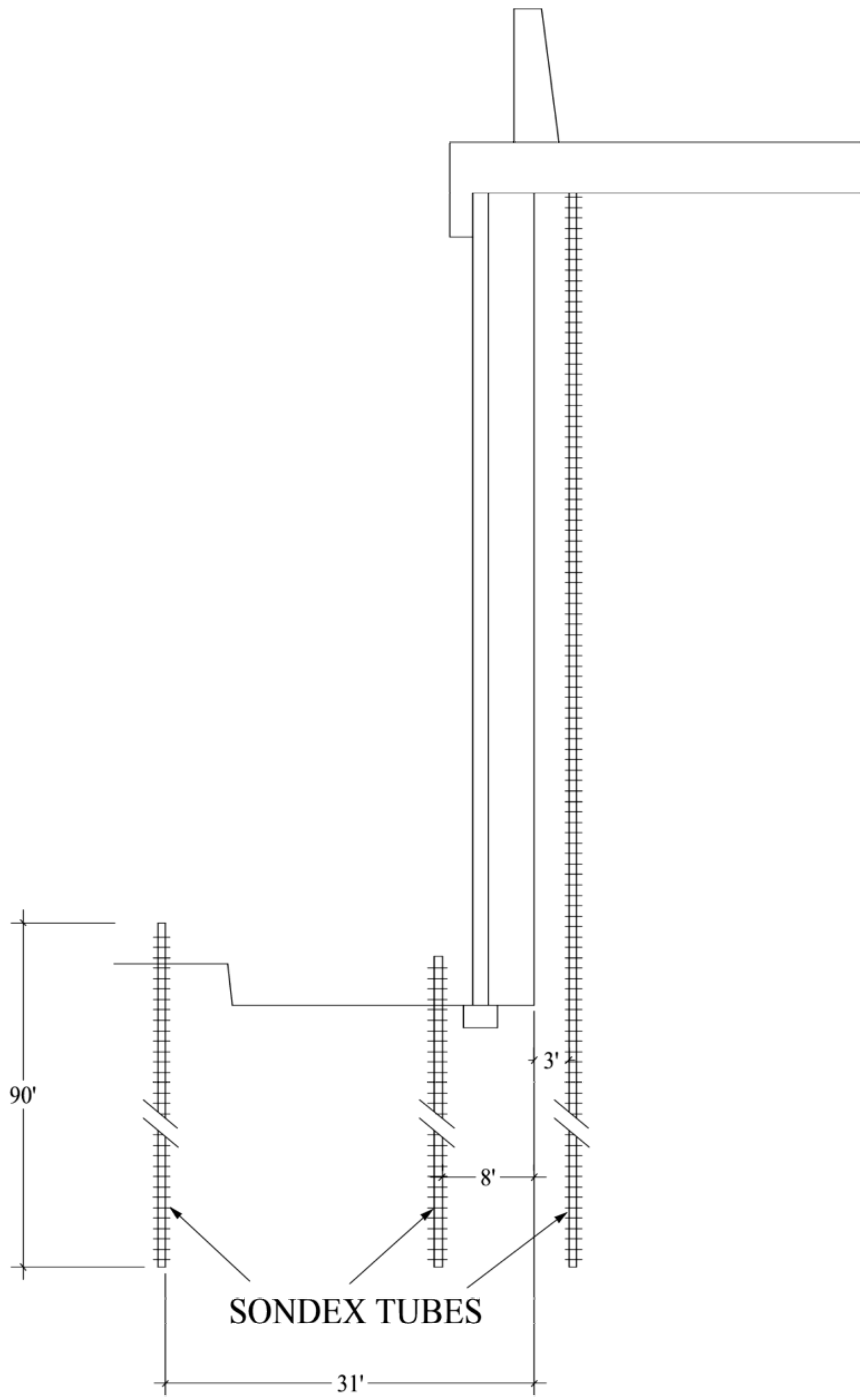


Figure 4.26. Elevation view of the instrumented section with the Sondex tube, S1, S2, and S3.

Figure 4.27. Photographs showing Sondex sensor and readings being taken in the field.

4.3.4 Description of Survey Monuments and Placement

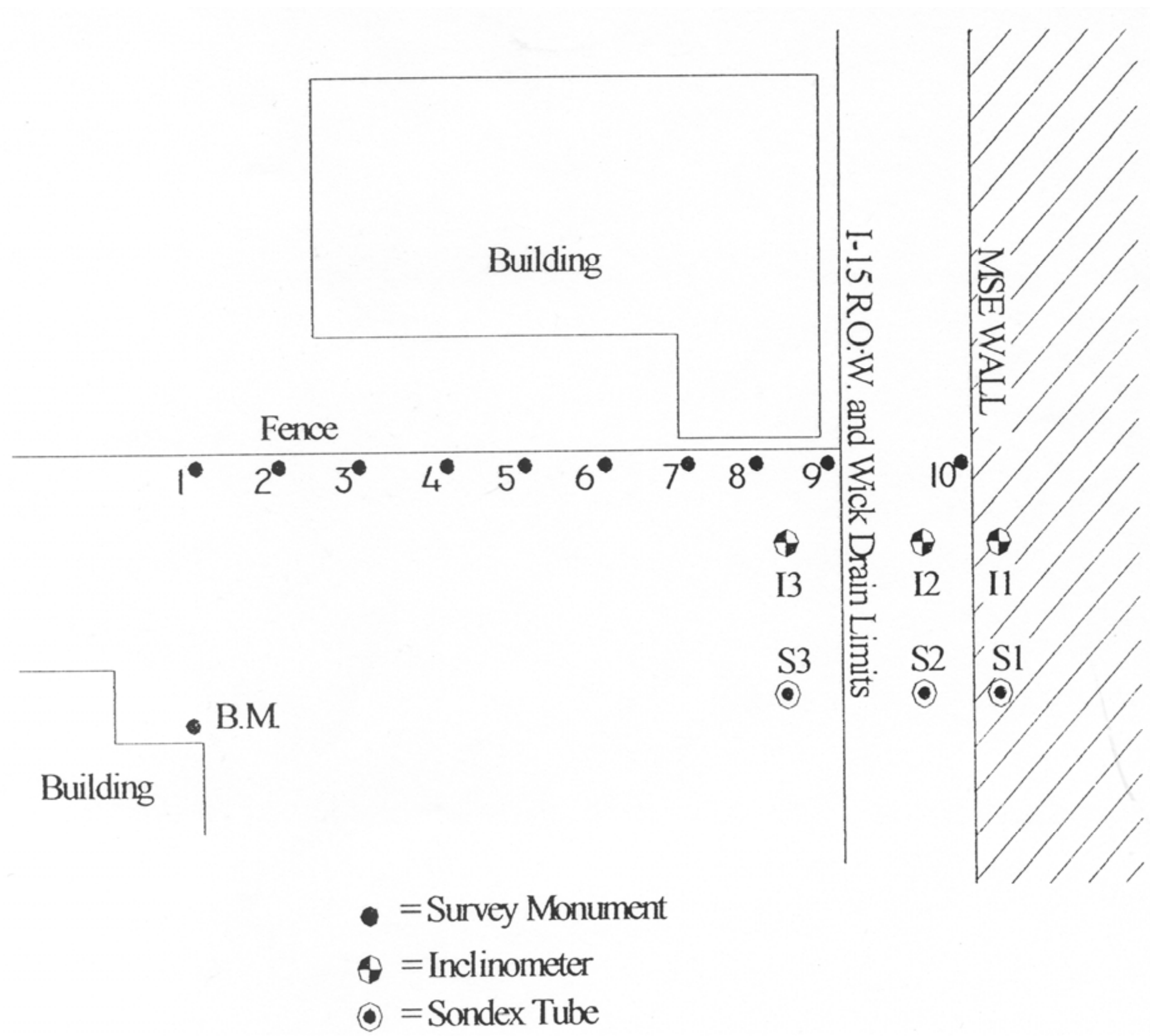
To monitor settlement of the ground surface, survey monuments were placed along a line beginning at the face of the wall extending away from the wall as demonstrated by Figure 4.28. These monuments were constructed using the same design as other survey monuments used by the Utah Department of Transportation, Research Division. An 18 inch (0.457 m) long threaded 0.5 inch (12.7 mm) diameter pipe was driven into the ground and a 3 ft (0.914 m) long piece of rebar was driven though the center of the threaded pipe. Because the rebar was located down inside the threaded pipe, an intermediate rod of 0.4922 ft (150.0 mm) was used between the survey rod and the rebar to read any elevation change in the ground surface. The threaded pipe was placed around the rebar to prevent frostheave that may affect any elevation readings.

Sixteen survey monuments were installed in various locations to monitor settlement at the surface. These monuments were installed with the intent of measuring a settlement profile leading away from the face of the wall.

4.4 Wall Construction and Instrument Installation

The construction of Wall R-346-1C began with the laying out of the bent W2 fascia panels spaced about every 10 ft (3.05 m). The W panels were then connected to the W2 panels, the geofabric laid in place, and a small amount of backfill was placed on the bent portion of the W2 panels to help anchor them. After this, the primary reinforcing mats were laid into place as shown in Figure 4.29.

The wall was then backfilled and compacted with a 1 ft (0.305 m) lift of soil. Intermediate mats were then placed and a 1.5 ft (0.457 m) lift of soil was added. After the last intermediate mat, the lifts increased to 2.5 ft (0.76 m) with only primary reinforcing mats being placed.



4.28. Plan view of the instrumented section with survey monuments.

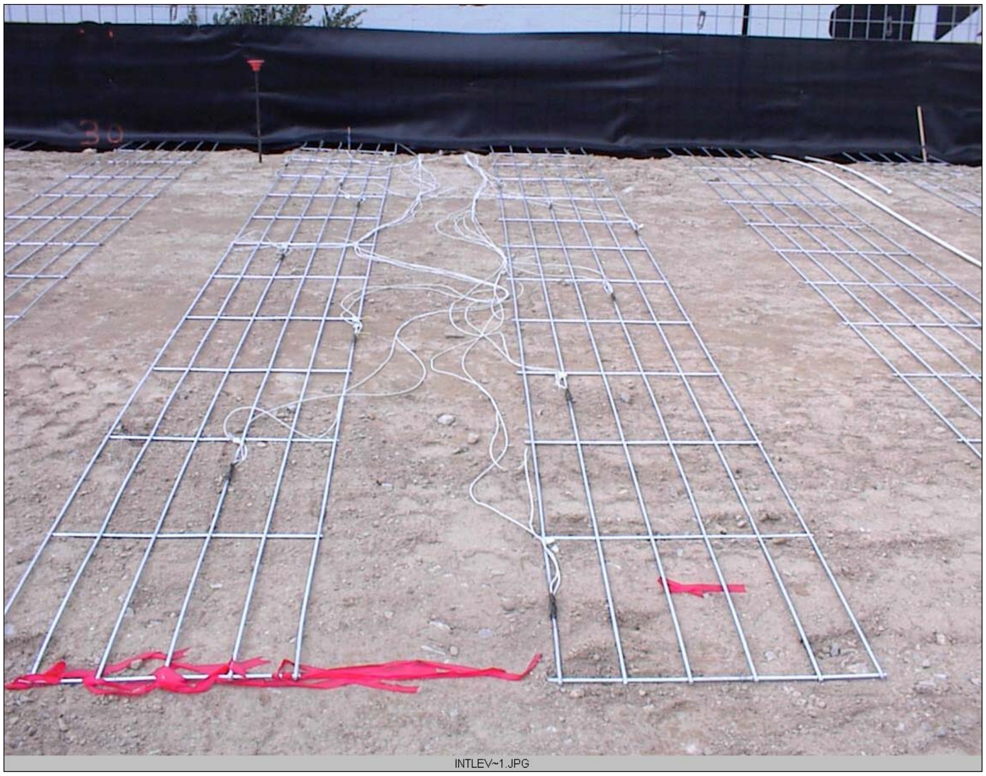


Figure 4.29. Photograph of first primary mats after placement of W2 fascia bar mats.

The typical construction sequence for each lift of soil was as follows. Backfill was transported to the site and dumped by belly dump trucks and soil graders were used to spread the soil in approximately 1 ft (0.305 m) thickness. A heavy vibrating roller was then used to compact and smooth the soil. This was repeated until a lift of 2.5 ft (0.76 m) was achieved. To avoid excessive deformations at the wall face, roller compaction ended 3 ft (0.914 m) from the wall face. The region within 3 ft (0.914 m) of the wall face was compacted with a hand vibrating plate similar to the one shown in Figure 4.30. A nuclear density gauge was used by Wasatch Constructor quality control to measure soil densities and moisture contents of each lift. Figure 4.31 shows a photograph of the wall nearing

Figure 4.30. Photograph of a hand vibrating plate used to compact soil within a 3 ft distance of the wall face.

Figure 4.31. Photograph of Wall R-346-1C nearing completion.

completion. Initial readings were taken at the time the mats were laid in place to indicate the strain reading corresponding to zero tension in the wires. Each reading was taken by connecting each pin connector to the switching plug installed on the Multiplexer as shown in Figure 4.11. A computer program from Campbell Scientific was used to take readings from the gages. Readings were taken as lifts of soil were added to the wall. The difference between the initial reading and a subsequent reading is a measure of the strain induced from the backfill placed over the mat at the time of the reading. The data collected were saved in an ASCII format, which was later formatted into an EXCEL spreadsheet. The strain gages were calibrated in the lab at Utah State University in the Tinius-Olsen machine and a calibration factor was determined to convert the raw voltage data into forces. The calibration curves for the two different diameter bars used in this project are shown in the Appendix in Figures B1 and B2.

CHAPTER 5

FIELD BEHAVIOR OF MSE WALL R-346-1C DURING CONSTRUCTION: RESULTS AND INTERPRETATION

5.1 Introduction

In this chapter, the results of field measurements on MSE Wall R-346-1C based on the instrumentation program discussed in Chapter 4 are presented. The behavior of the wall during construction is analyzed and compared to the existing design methods for welded wire mesh reinforced soil systems. This chapter is composed of two sections; one section dealing with forces and pressures and another section dealing with deformations. The section on forces and pressures demonstrates the various forces and pressures shown by the strain gages and total pressure cells. The deformations section deals with the vertical and horizontal movements of the wall and surrounding soil.

5.2 Forces and Pressures

5.2.1 Bar Forces in the Reinforcing Mats

Horizontal stress distributions in the wall were measured with strain gages attached to the welded wire bar mats. The installation of instrumented bar mats is discussed in section 4.2. The force induced in the bar mats by the backfill placed above the mat at the time of readings is obtained from the difference between the initial and subsequent readings. The difference in readings was converted to a force, F, by using a calibration factor that was previously determined (see Appendix B for calibration factors).

Figures 5.1, 5.2, 5.3, and 5.4 show the measured bar forces for instrumented mats IL2, IL6, PL2, and PL6, respectively. The plots show the bar forces versus height of fill above the mat level. Since many gages were lost on both mats, the data obtained from both mats on a given level was combined. Similar plots for other instrumented mat layers for both instrumented sections of wall are given in the Appendix (Figures C1 to C17). The data contained in these plots is given in Appendix E.

Figures 5.5, 5.6, 5.7, and 5.8 show measured loads as a function of distance from the face of the wall for different heights of fill above the mat for bar mats IL2, IL6, PL2, and PL6, respectively. Similar plots for other instrumented mat layers for both instrumented sections of wall are given in the Appendix (Figures D1 to D17). Again, the data contained in these plots is given in Appendix E.

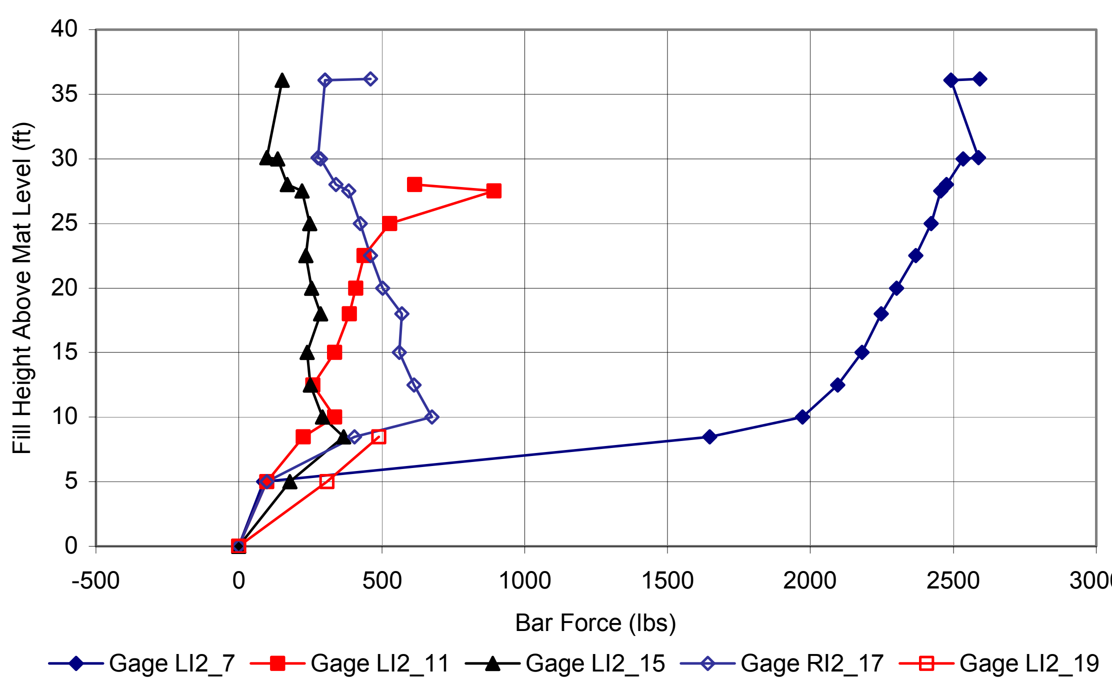


Figure 5.1. Measured bar forces plotted with height of fill above the intermediate and primary reinforcement layer No. 2.

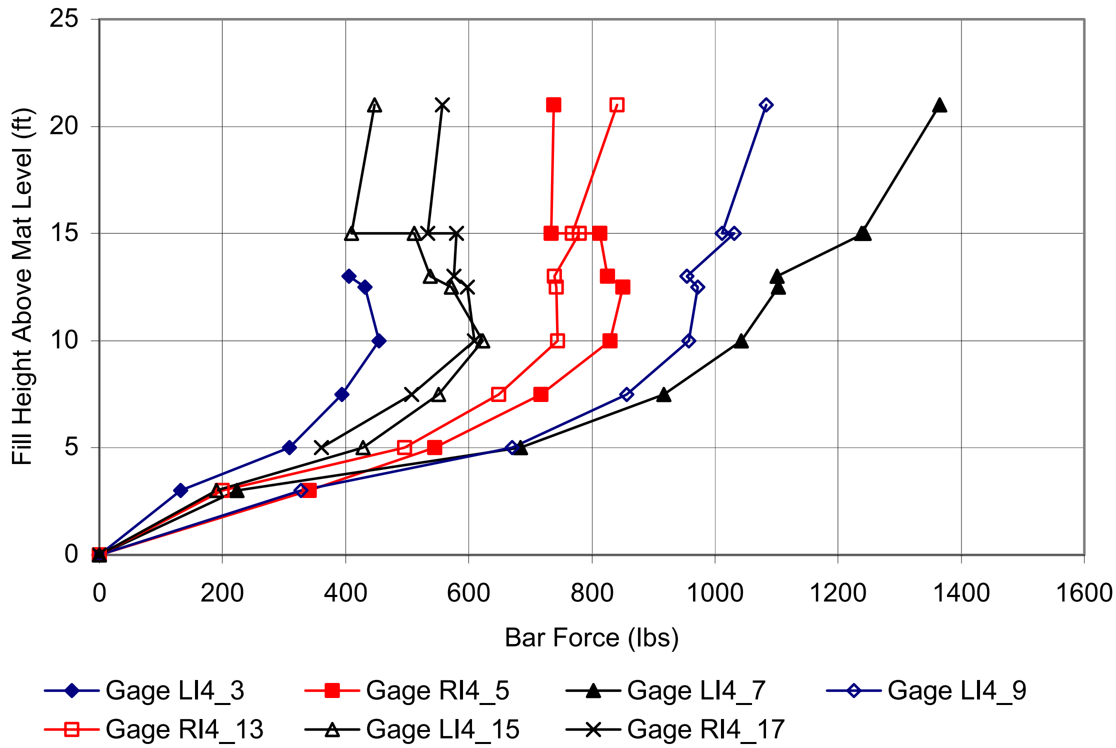


Figure 5.2. Measured bar forces plotted with height of fill above the intermediate and primary reinforcement layer No. 4.

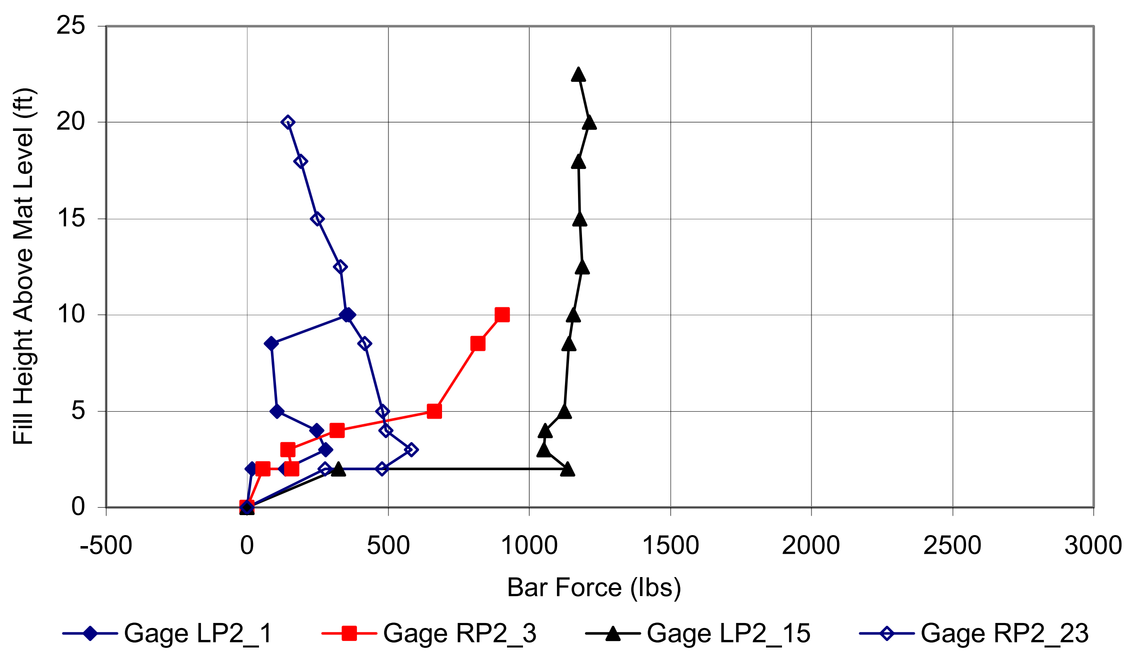


Figure 5.3. Measured bar forces plotted with height of fill above the primary reinforcement-only layer No. 2.

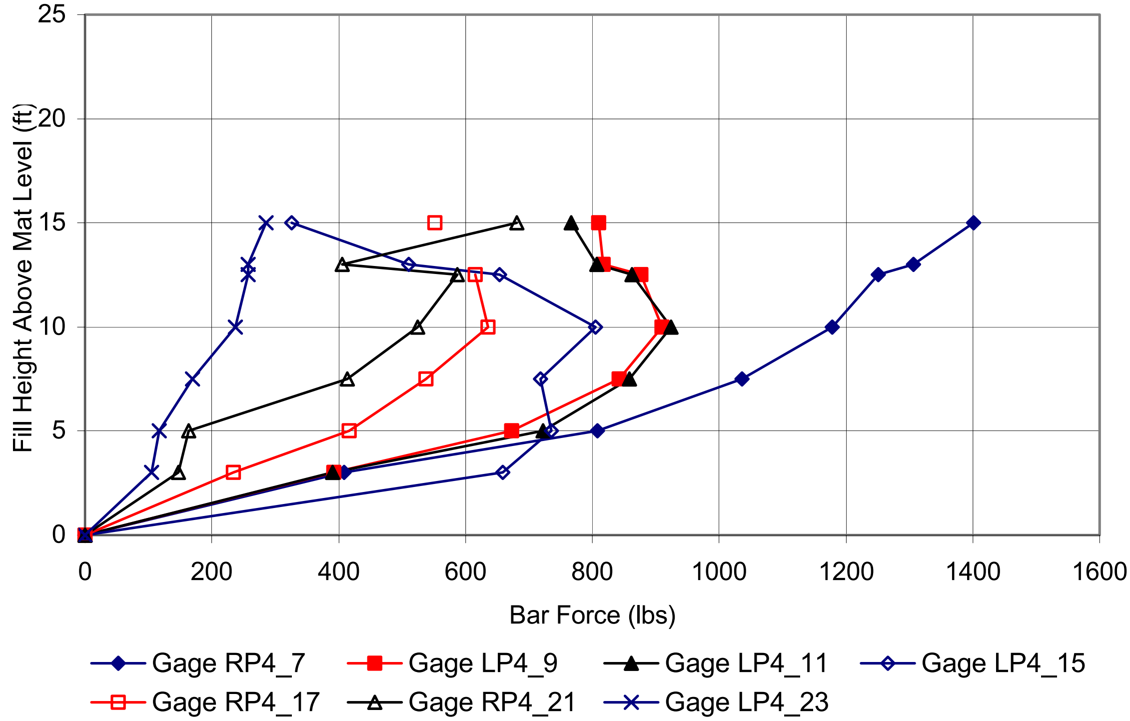


Figure 5.4. Measured bar forces plotted with height of fill above the primary reinforcement-only layer No. 4.

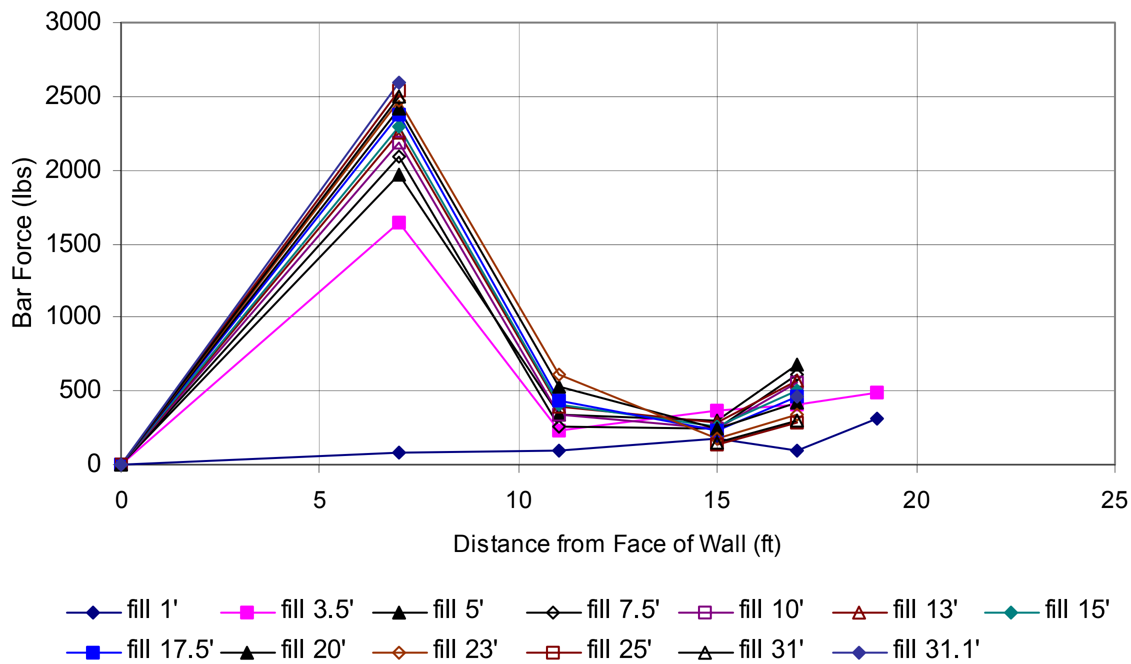


Figure 5.5. Measured bar forces plotted with distances from the face of wall for intermediate and primary reinforcement layer No. 2.

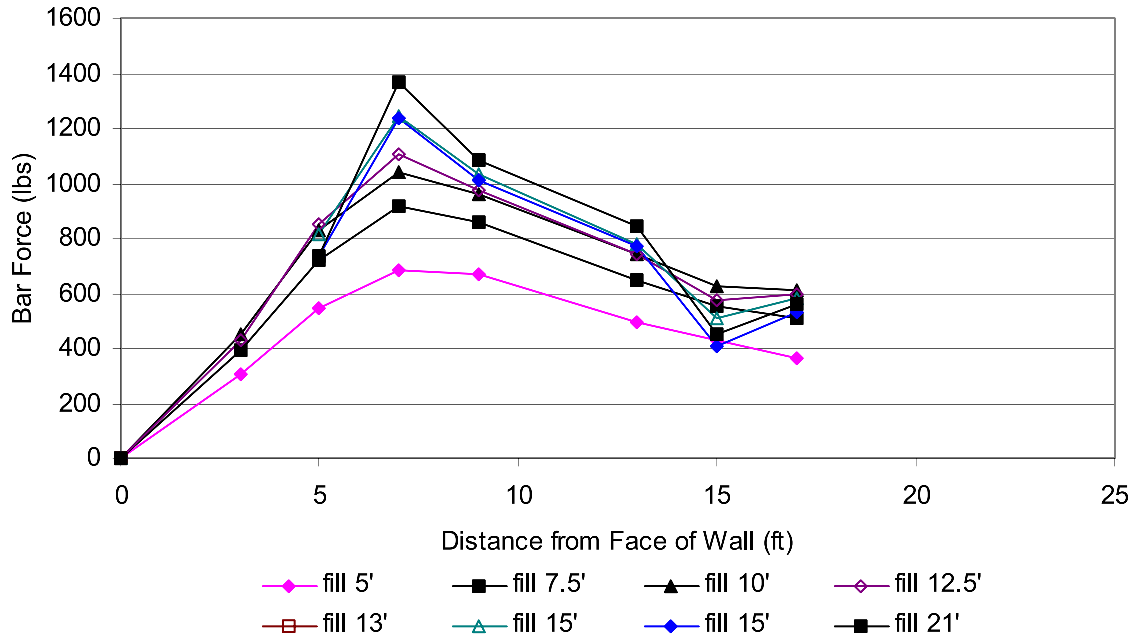


Figure 5.6. Measured bar forces plotted with distances from the face of wall for intermediate and primary reinforcement layer No. 4.

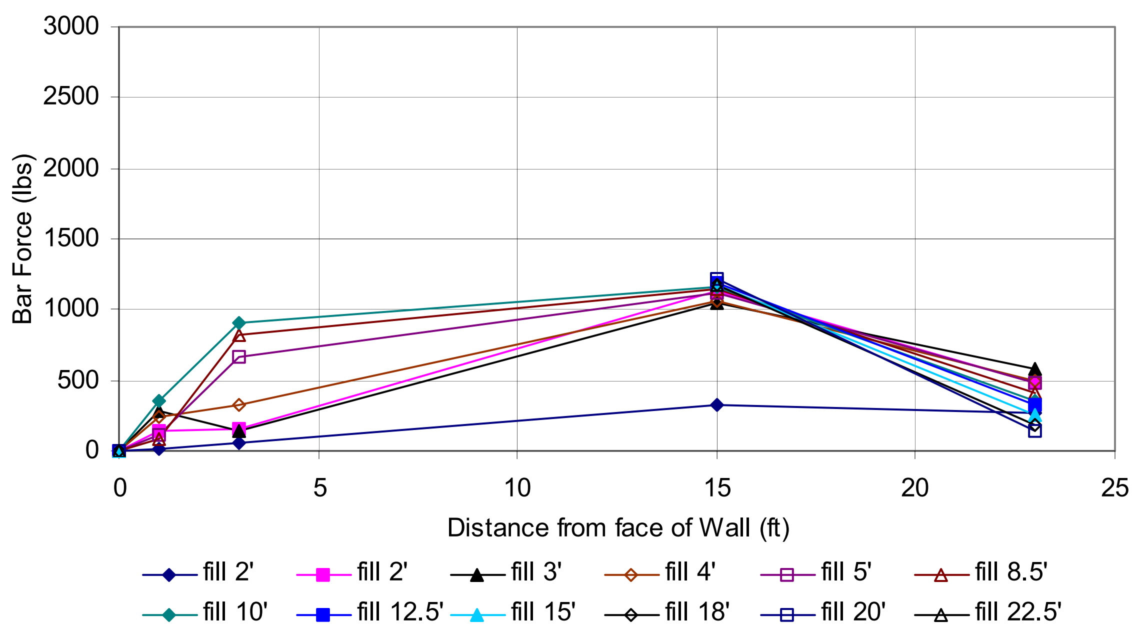


Figure 5.7. Measured bar forces plotted with distances from the face of wall for primary reinforcement-only layer No. 2.

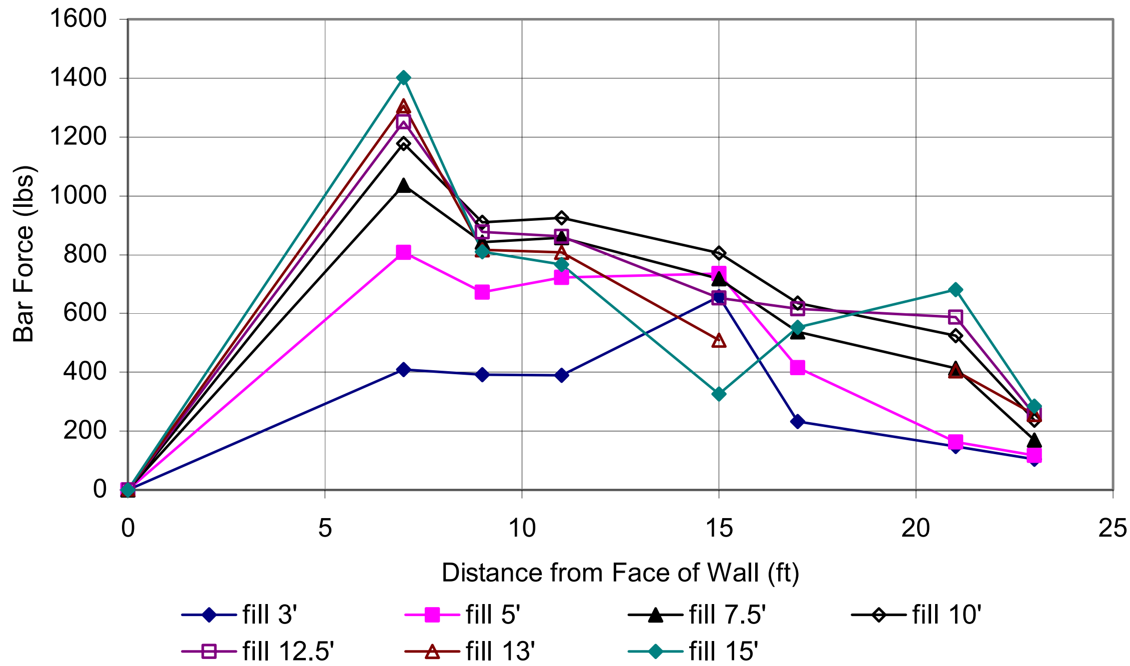


Figure 5.8. Measured bar forces plotted with distances from the face of wall for primary reinforcement only layer No. 4.

5.2.2 Lateral Earth Pressure Coefficient, K

The maximum bar force, F_{max} was obtained for each mat at different heights of the wall. The maximum lateral earth pressure coefficient, K_{max}, was calculated from the following equation:

$$K_{\max} = \frac{N_{bar} F_{\max}}{\gamma z S_h S_v} \qquad \text{(Eq. 5.1)}$$

where:

N_{bar} is the number of longitudinal bars in the bar mat being evaluated,
F_{max} is the maximum bar force measured in the given bar mat,
γz is the vertical stress calculated due to simple overburden,
S_h is the horizontal center-to-center spacing between consecutive bar mats, and
S_v is the vertical spacing between layers of bar mats.

Equation 5.1 accounts for the weight of compacted backfill above the mat and neglects any non-uniformity of the wall base pressure distribution due to overturning action. This method of back calculating K was implemented by Anderson, Sharp, and Harding (1987) to develop an envelope of the lateral earth pressure coefficient, K, for welded wire retaining walls. Since the increase in vertical stress caused by overturning moments is not considered, this approach may overpredict the actual K value (Anderson, Sharp, and Harding, 1987). Figures 5.9 through 5.12 calculate the vertical stress using overburden (γz), again not taking overturning into consideration. Figures 5.13 through 5.16 calculate vertical stress according to the Meyerhof equation (AASHTO, 1998), which does account for the overturning action. These are given for comparison.

Figures 5.9 and 5.10 show the maximum back calculated values of K for the section with primary and intermediate reinforcement, and the section with only primary reinforcement, respectively. The values were computed from Equation 5.1. In general, values were lower than the design envelope given by AASHTO (1998) since the wall was lightly reinforced. Some values that seem to exceed the design envelope occurred in cases where mats near the base of the wall were subjected to high stresses early in wall construction. These high stresses are mainly due to construction stresses, and are not of concern, as can be seen in the much lower values for a given mat as construction proceeds. As noted in Figure 5.9, the effects of the intermediate reinforcement have been ignored in back calculating the values of K for the primary reinforcement mats. This is due to the fact that not enough is known about this uncommon system of reinforcement to warrant adjusting for the additional reinforcement layers.

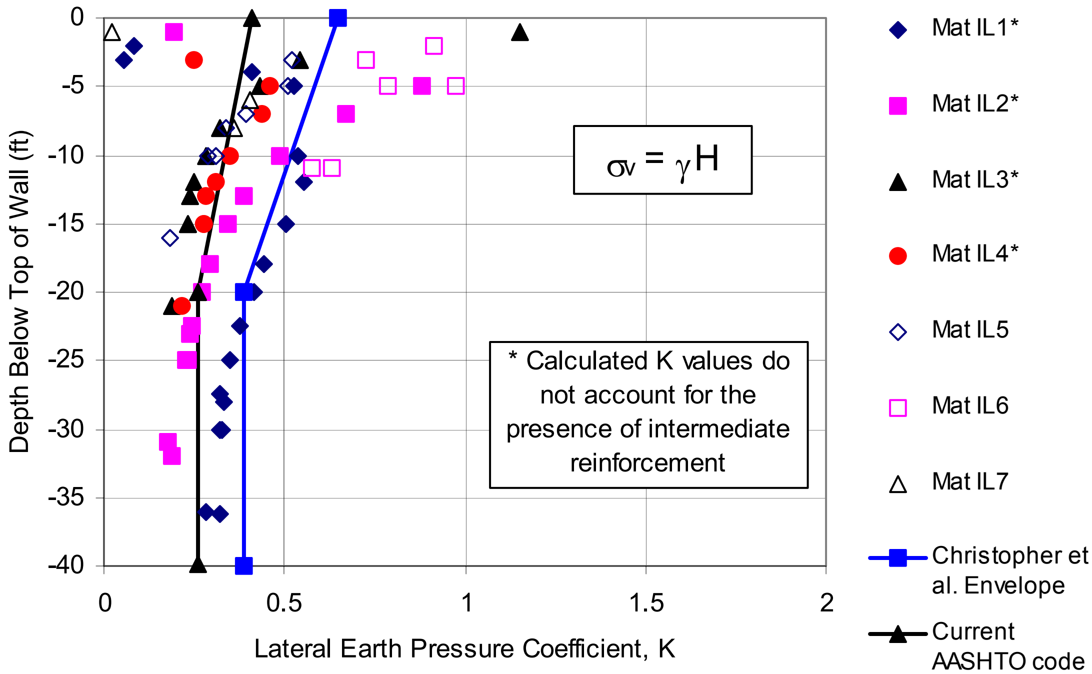


Figure 5.9. Maximum back-calculated values of K for the section of Wall R-346-1C with intermediate and primary reinforcement.

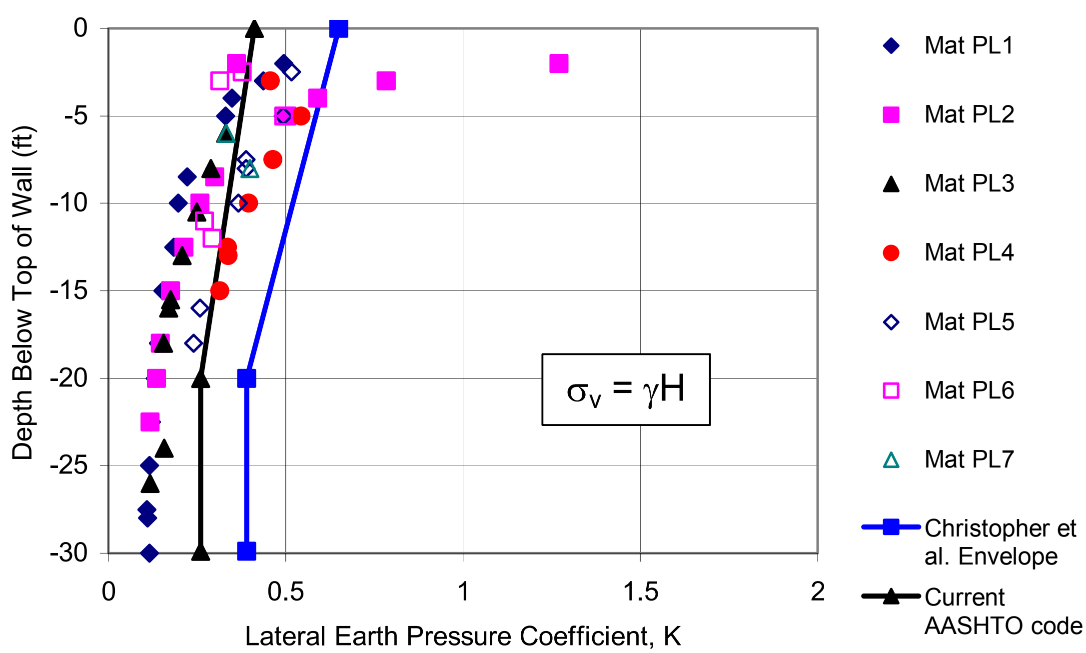


Figure 5.10. Maximum back-calculated values of K for the section of Wall R-346-1C with primary reinforcement only.

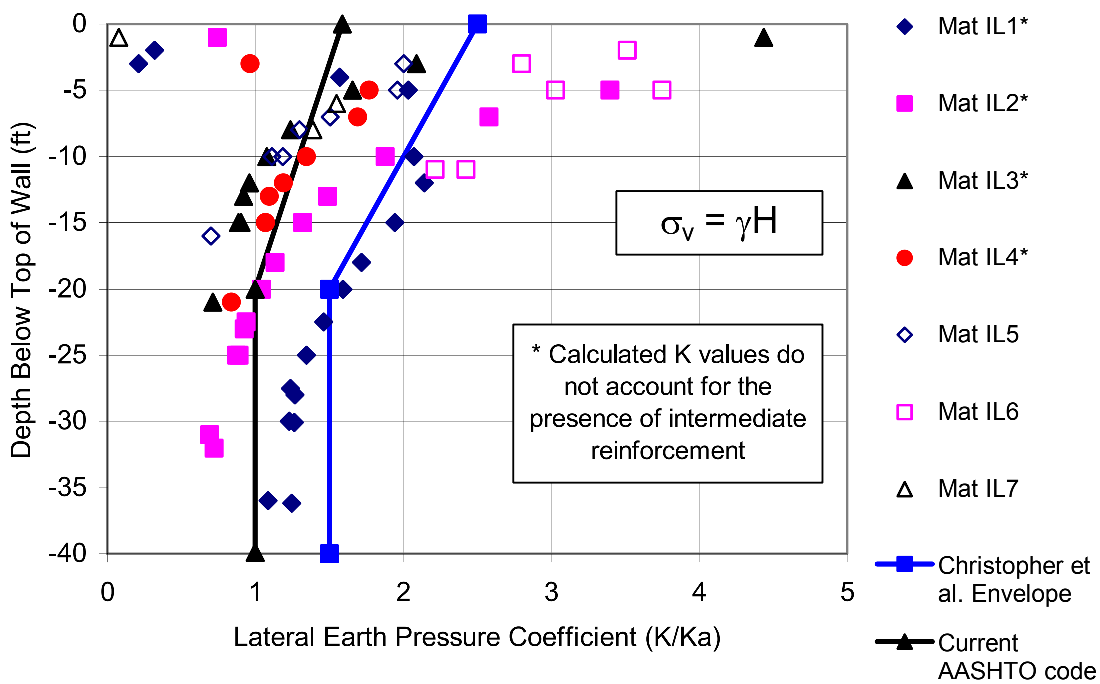


Figure 5.11. Normalized values of K for the section of Wall R-346-1C with both intermediate and primary reinforcement (ϕ = 36 degrees).

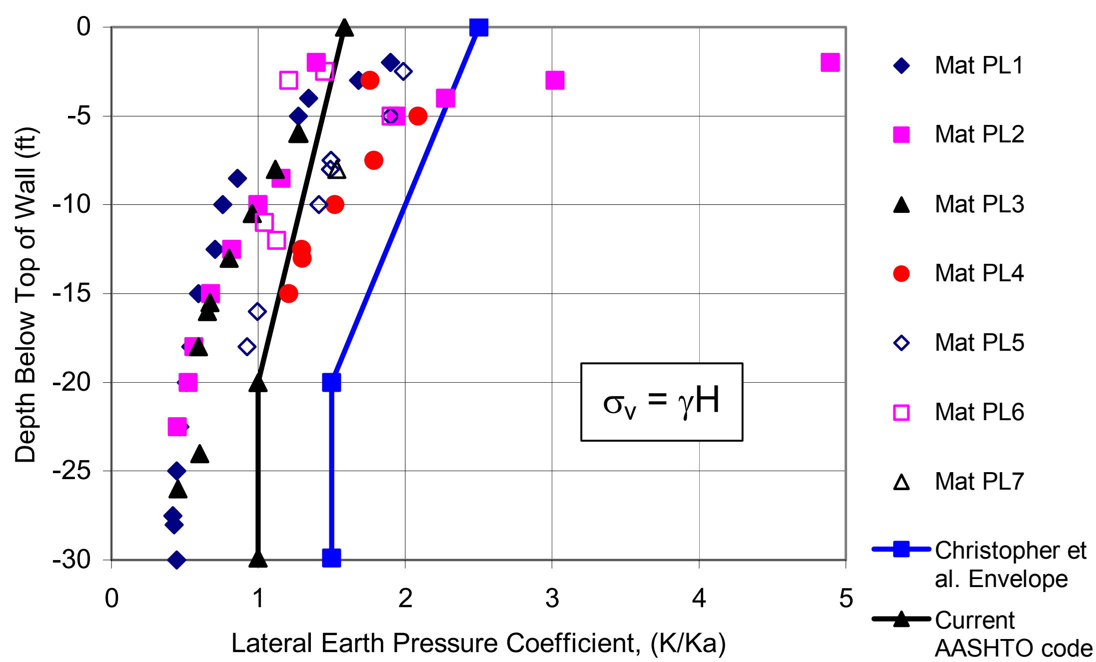


Figure 5.12. Normalized values of K for the section of Wall R-346-1C with primary reinforcement only (ϕ = 36 degrees).

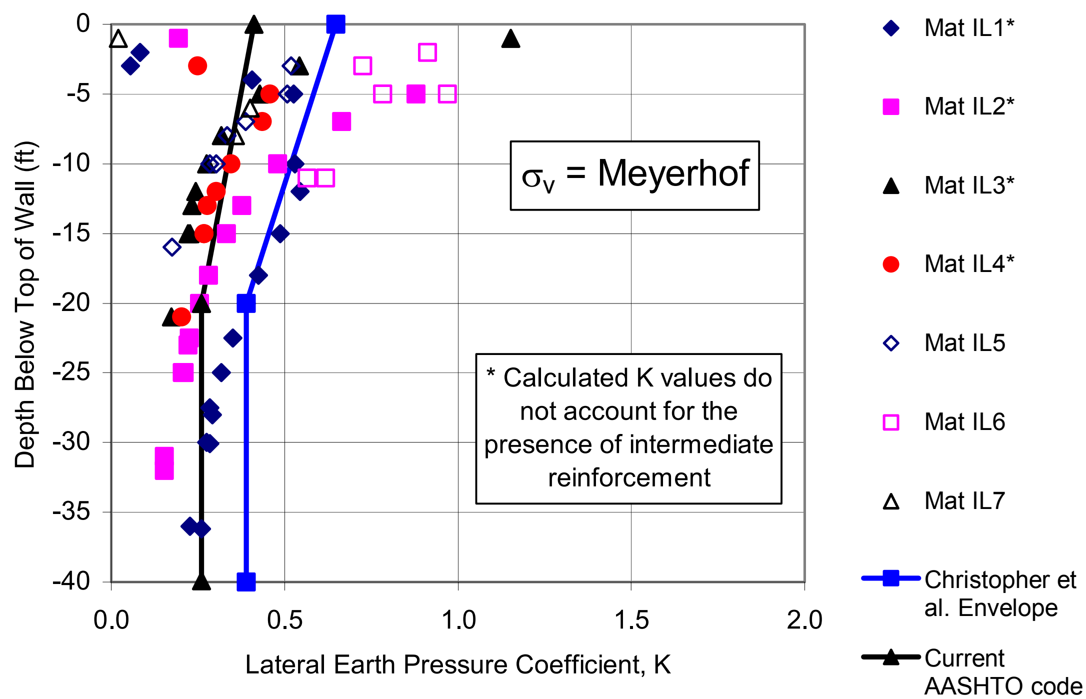


Figure 5.13. Maximum back-calculated values of K for the section of Wall R-346-1C with intermediate and primary reinforcement (Meyerhof).

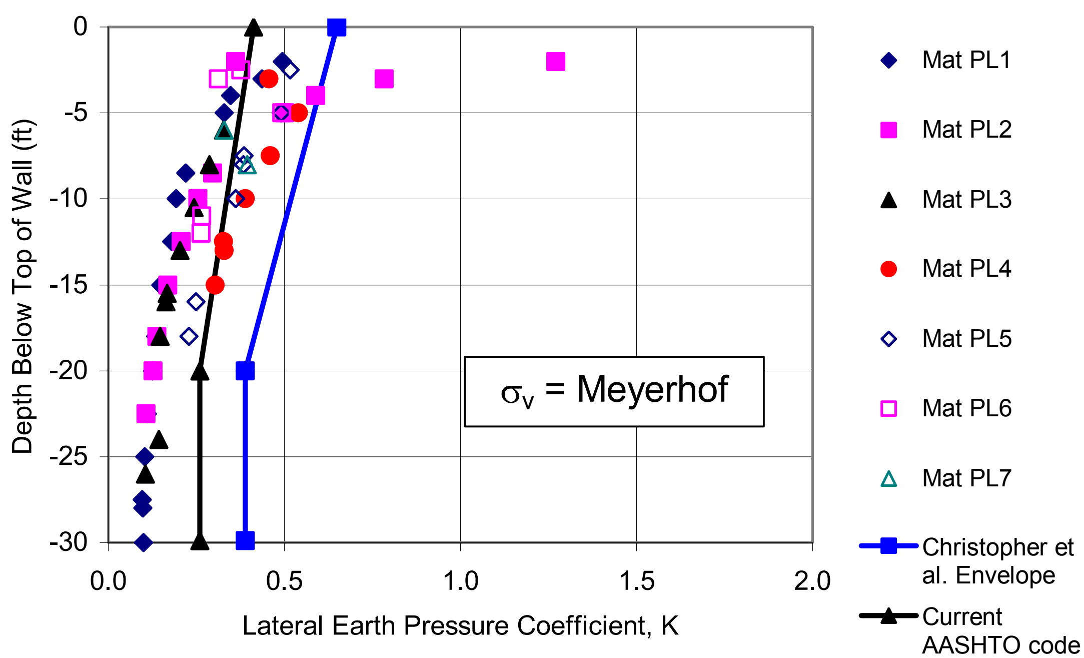


Figure 5.14. Maximum back-calculated values of K for the section of Wall R-346-1C with primary reinforcement only (Meyerhof).

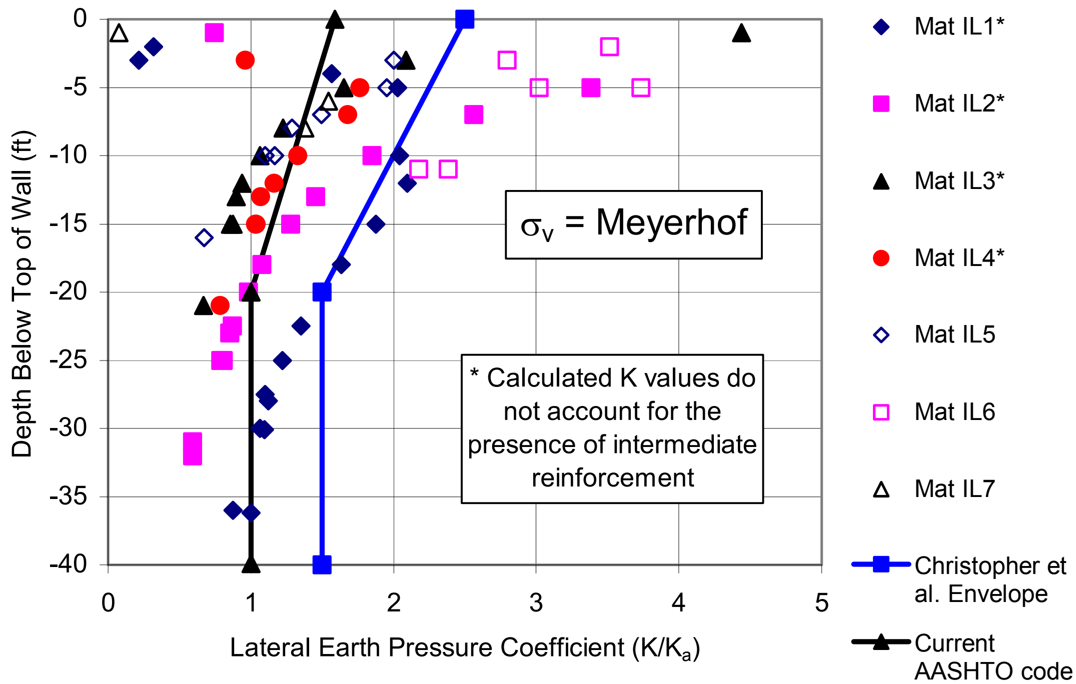


Figure 5.15. Normalized values of K for the section of Wall R-346-1C with both intermediate and primary reinforcement (ϕ = 36 degrees) (Meyerhof).

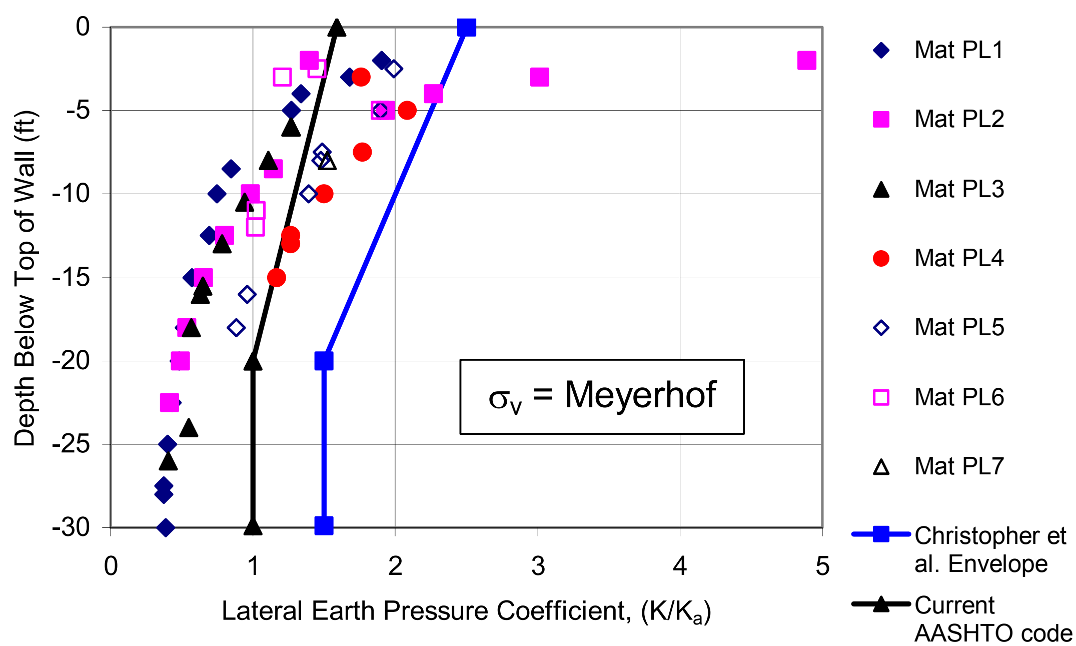


Figure 5.16. Normalized values of K for the section of Wall R-346-1C with primary reinforcement only (ϕ = 36 degrees) (Meyerhof).

The data presented in Figures 5.9 and 5.10 have been normalized in Figures 5.11 and 5.12 with respect to the active earth pressure coefficient, K_a and plotted. The design envelope as suggested by Christopher et al. (1989) as described in section 2.2 is also given in the figures to compare against the actual field data. Also given is the current wire mesh envelope as adopted by AASHTO (1998).

5.2.3 Location of Loci of Maximum Tension

The distribution of bar forces in the longitudinal wires of each instrumented mat for the two different wall sections are shown in Figures 5.17, 5.18, 5.19, and 5.20. Figure 5.17 shows the wall at a height of 15 ft (4.57 m) in the intermediate and primary reinforced section. Figure 5.18 gives the wall height at 30 ft (9.14 m) in the same section of wall as Figure 5.17. Figures 5.19 shows the wall at a height of 15 ft (4.57 m) in the primary reinforced only section of the wall. Figure 5.20 gives the wall height at 30 ft (9.14 m) in the same section of wall as in Figure 5.19. The assumptions for the bilinear potential failure line and Coulomb potential failure line are also given the figures.

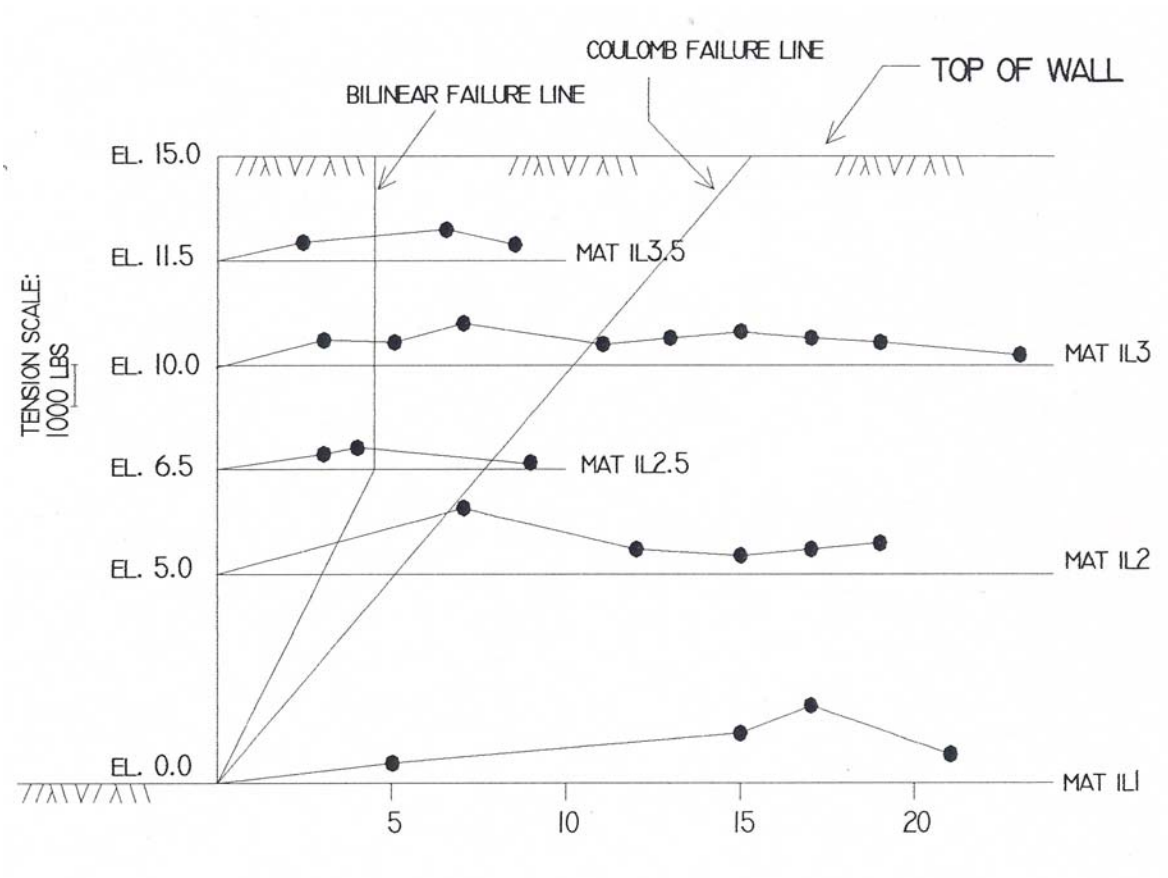


Figure 5.17. Distribution of tension in bar mats located in the intermediate and primary reinforcement section of Wall R-346-1C at a wall height of 15 ft.

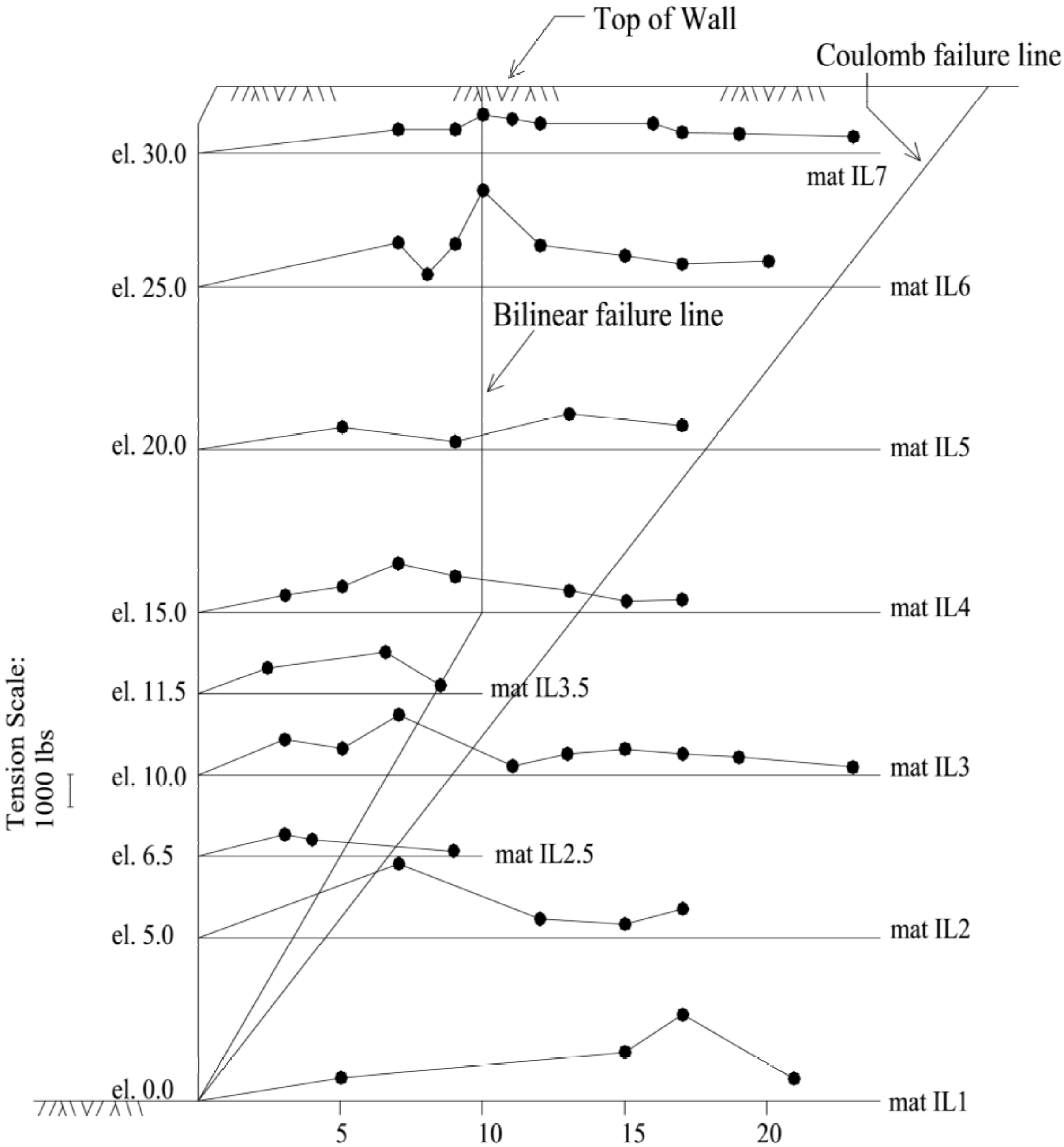


Figure 5.18. Distribution of tension in bar mats located in the intermediate and primary reinforcement section of Wall R-346-1C at a wall height of 30 ft.

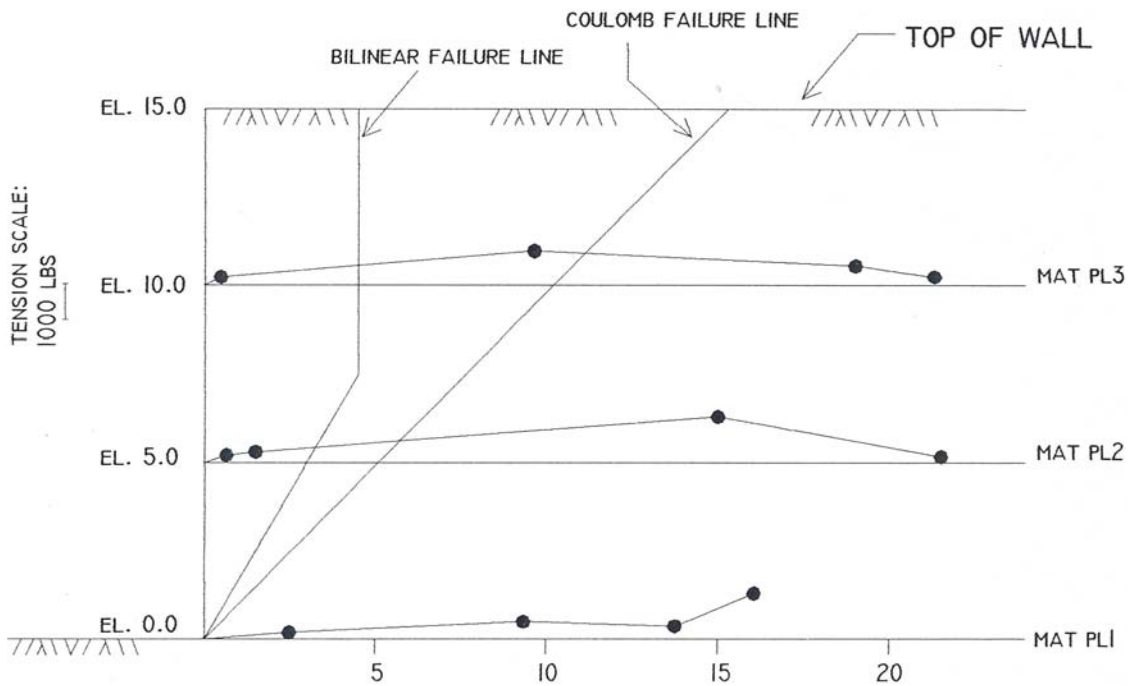


Figure 5.19. Distribution of tension in bar mats located in the primary reinforcement only section of Wall R-346-1C at a wall height of 15 ft.

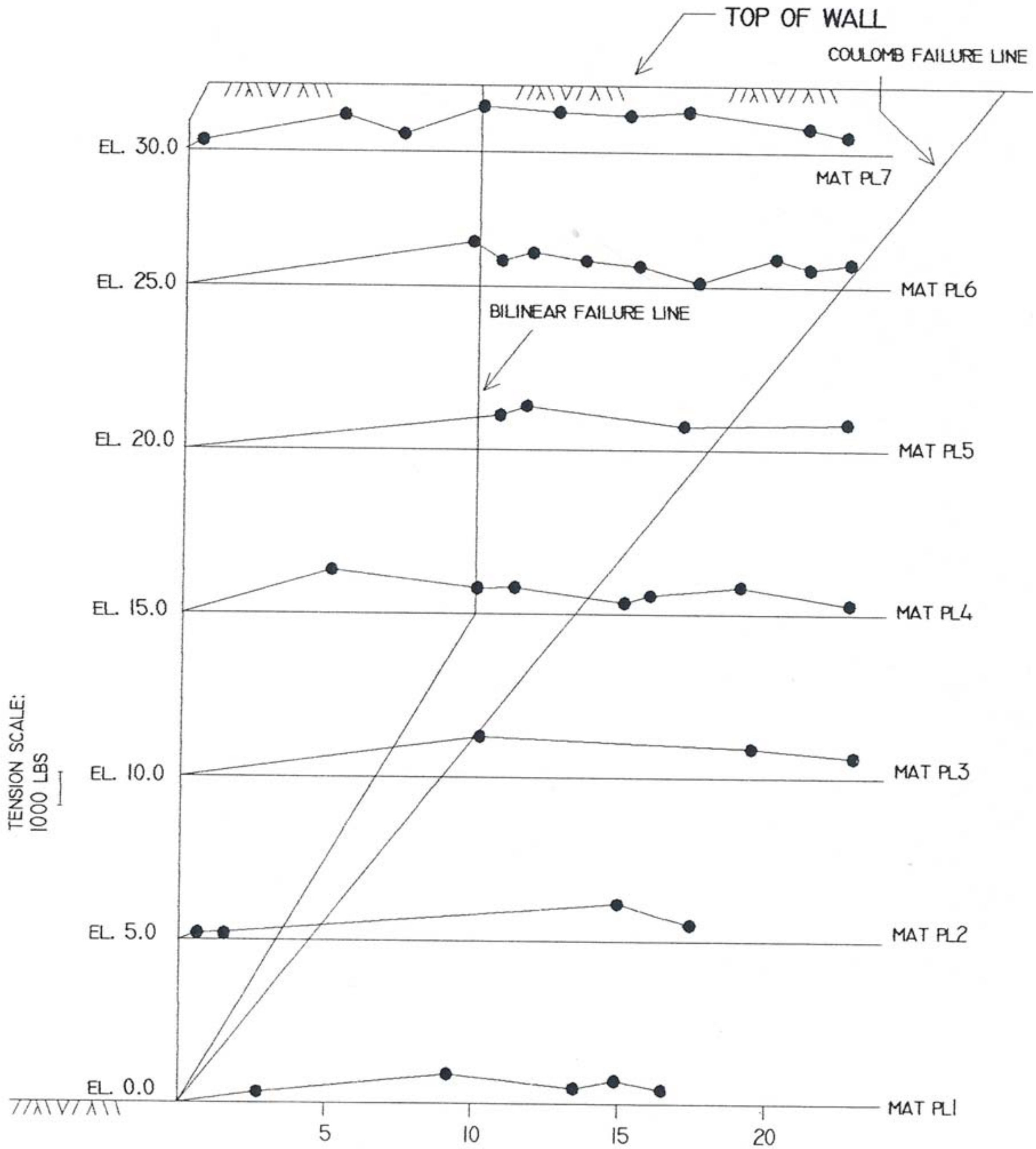


Figure 5.20. Distribution of tension in bar mats located in the primary reinforcement only section of Wall R-346-1C at a wall height of 30 ft.

5.2.4 Loads in the Fascia Bar Mats

As discussed in Chapter 4, the fascia bar mats in both sections were instrumented with strain gages (Figures 4.3 and 4.4) to measure the stresses in the fascia mats. During construction of the wall the gages were read as the height of the wall increased. Unfortunately, many of the gages were damaged during the wall construction process and only half-bridge readings (either top gage or bottom gage readings) were available at many of the gage locations. Half-bridge readings give the stresses due to bending and axial forces. Full bridge measurements give the stresses due to axial forces. The half-bridge readings were then plotted along with any full-bridge readings so the axial forces could be interpolated from the graph.

Figure 5.21 shows the stresses in the wall face in the primary reinforced only section, and Figure 5.24 (shown later) gives the stresses in the wall face in the intermediate and primary reinforced section. Next to each gage reading in Figures 5.21 and 5.24 is a corresponding label to identify that reading. The labels are as follows: FB is full-bridge, HBT is half-bridge top, and HBB is half-bridge bottom. The half- bridge top gage (HBT) reading is the gage located at the top of the instrumented bar element, where the half-bridge bottom (HBB) is the gage located at the bottom of the bar element. It appears that in both instrumented sections of wall, the highest loads were felt in the lower portion of the wall. These higher loads in both instrumented sections were also in compression. Since the wall face was flexible, the face deformed either by bulging or by concaving. This bending in the wall face explains why the stresses oscillated between positive and negative. Figure 5.21 gives the plotted half bridge and full bridge readings for the primary reinforced only section, whereby the axial stresses could be interpolated.

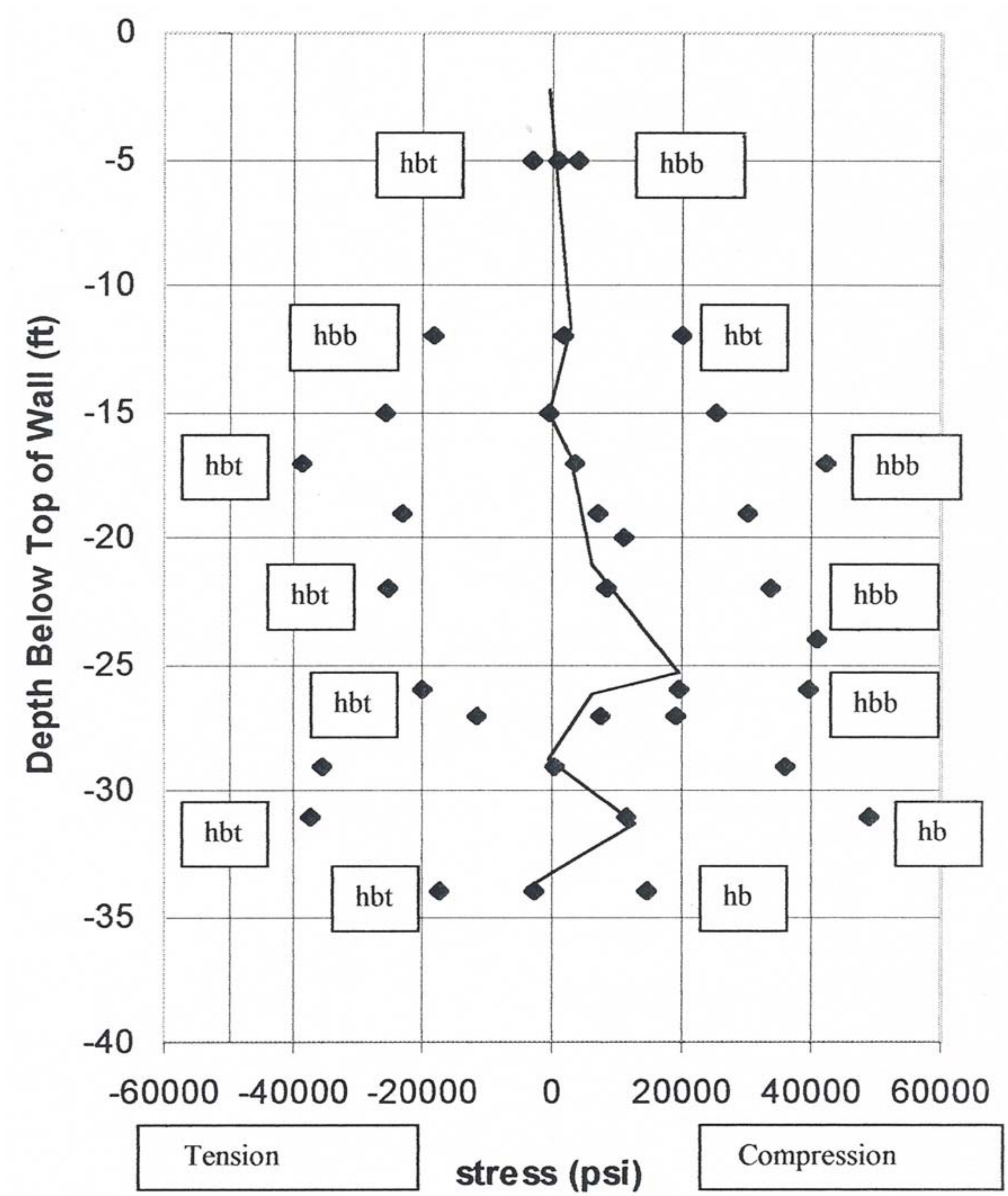


Figure 5.21. Distribution of stresses in fascia panels located in the section of the wall containing primary reinforcement only (line between represents interpreted axial stresses).

Figure 5.22 shows the axial stress interpolated from Figure 5.21. Figure 5.23 gives the calculated moment relative to the height of the wall for the primary reinforced only section. Figure 5.24 gives the plotted half-bridge and full-bridge readings for the primary and intermediate reinforced section, whereby the axial stresses could be interpolated. Figure 5.25 shows the axial stress interpolated from Figure 5.24. Figure 5.26 gives the calculated moment relative to the height of the wall for the primary and intermediate reinforced section.

5.2.5 Vertical Earth Pressures

Vertical base pressure readings were taken just before backfill was placed on the total pressure cells to achieve a zero reading. Immediately following the placement of backfill on them, another reading was taken and these readings continued as the wall height progressed. Figure 5.27 shows the vertical pressure plotted as a function of fill height above the total pressure cells. The two pressure cells installed closest to the wall face yielded low values relative to the other three. As indicated by Figure 5.27, the vertical pressure in TPC3 is significantly higher than the pressures located near the face of the wall. This behavior could be attributed to the redistribution of stresses near the face of the wall further back into the wall backfill. The theoretical overburden pressure is also plotted as shown by the lighter line. This line was computed as the product of the unit weight, γ, and the associated height of fill, H, above the cells. An average measured unit weight, γ, of 130 lb/ft^3 (20.4 kN/m^3) was used in the calculation. This value was the average of the nuclear gauge readings taken at various compacted lifts during wall construction.

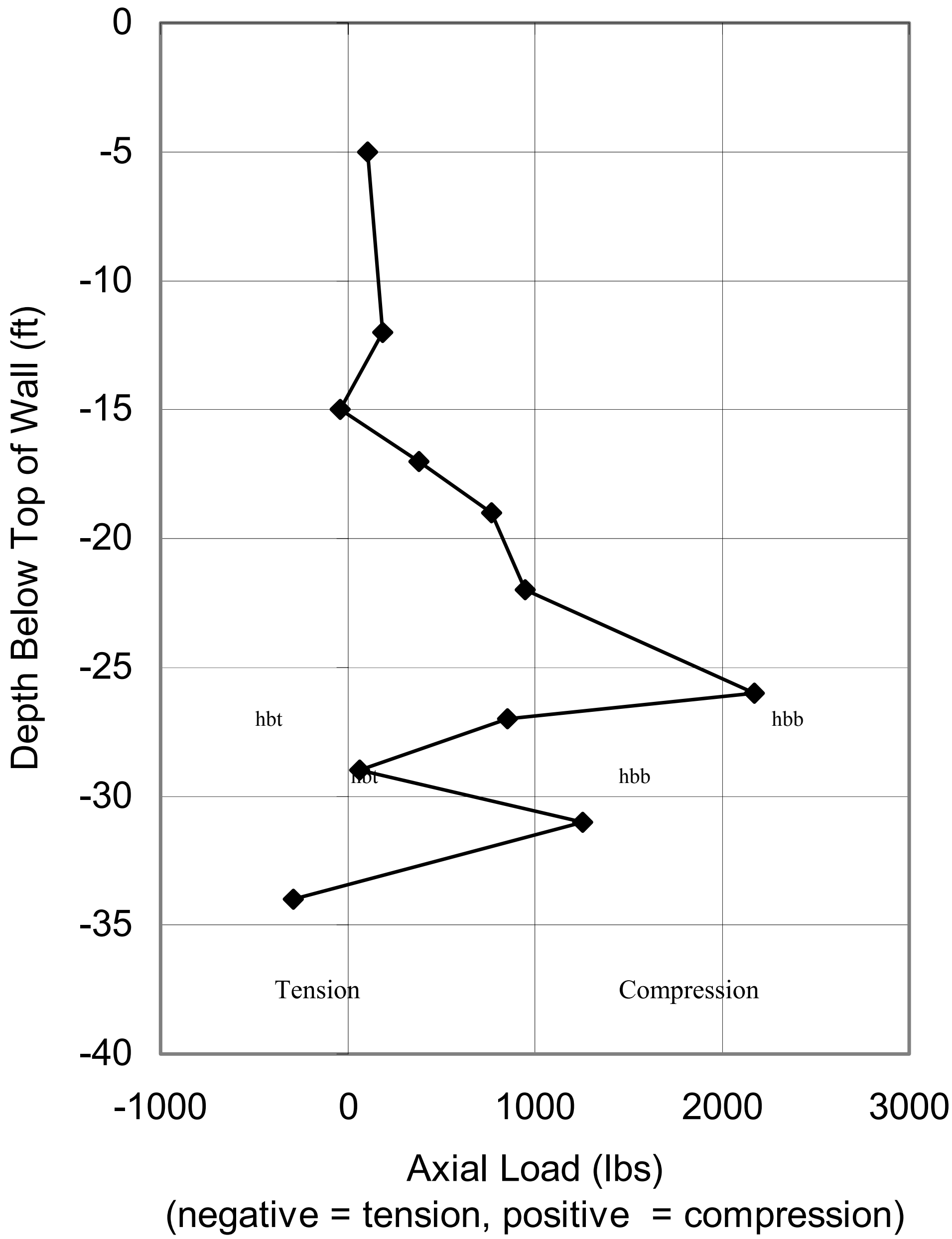


Figure 5.22. Distribution of the axial load below the top of the wall from interpreted results for the section of wall with primary reinforcement only.

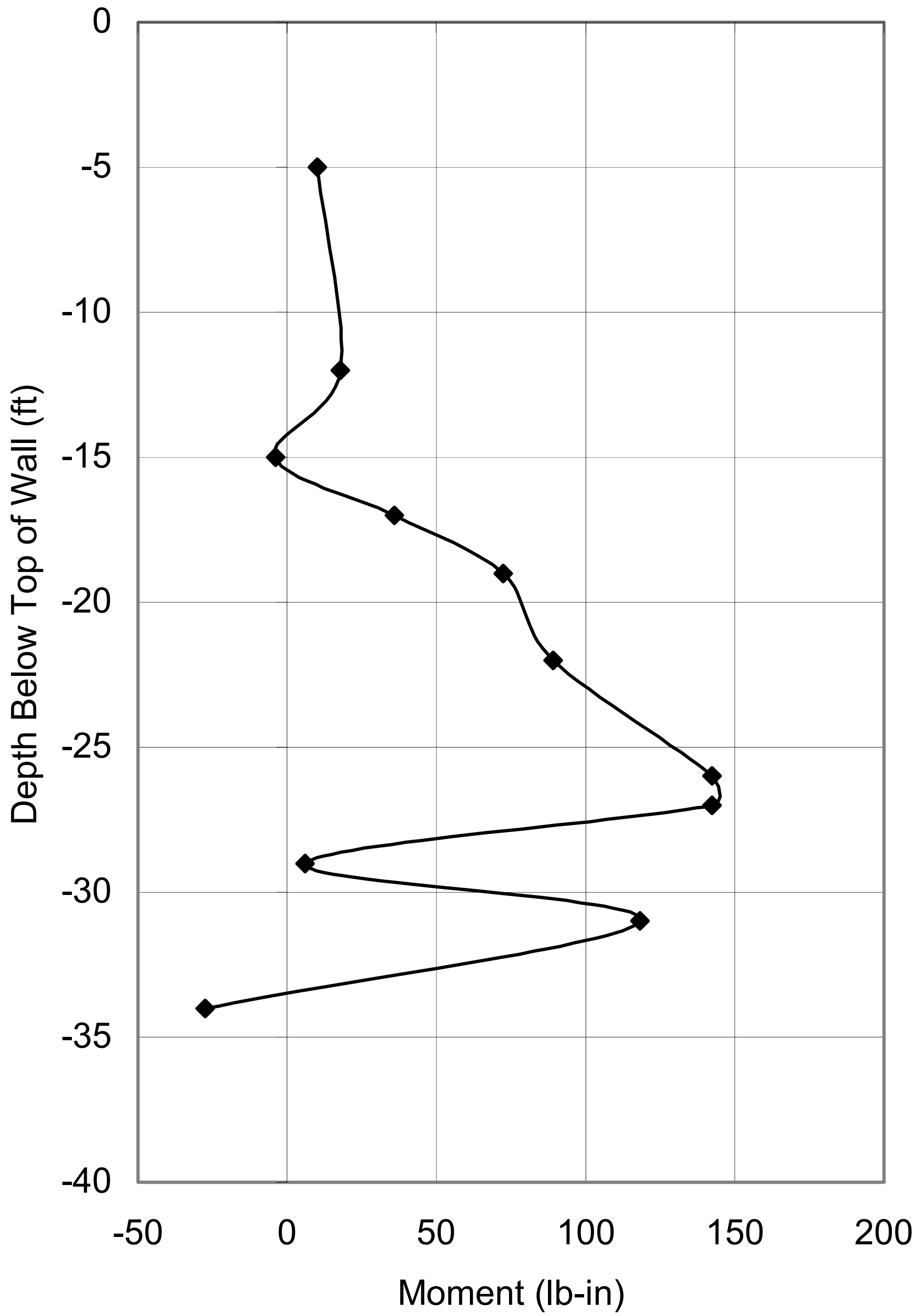


Figure 5.23. Distribution of the moment below the top of the wall from interpreted results in the section with primary reinforcement only.

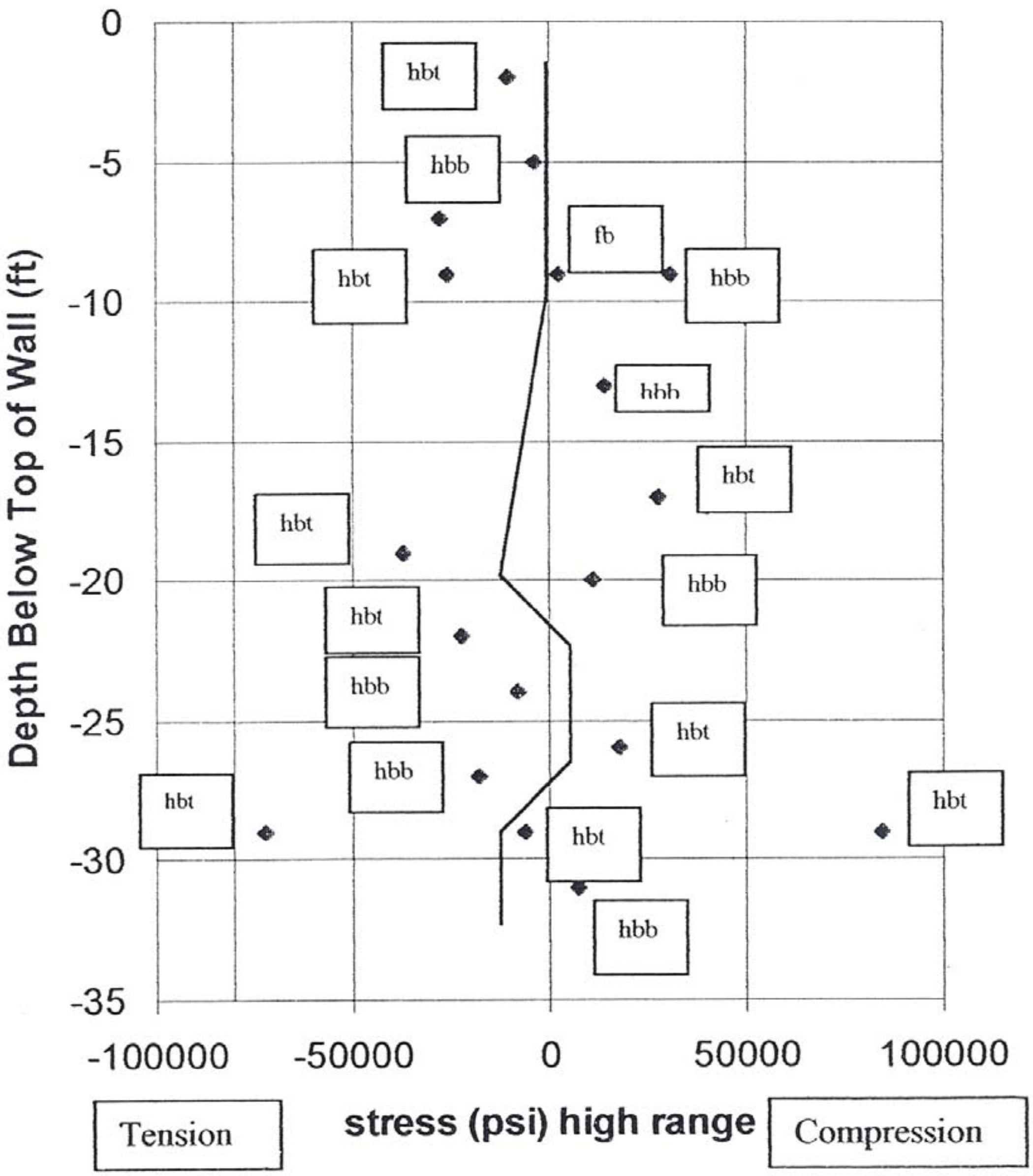


Figure 5.24. Distribution of stresses in fascia panels located in the section of the wall containing primary and intermediate reinforcement. (The line between points represents the interpeted axial stresses.)

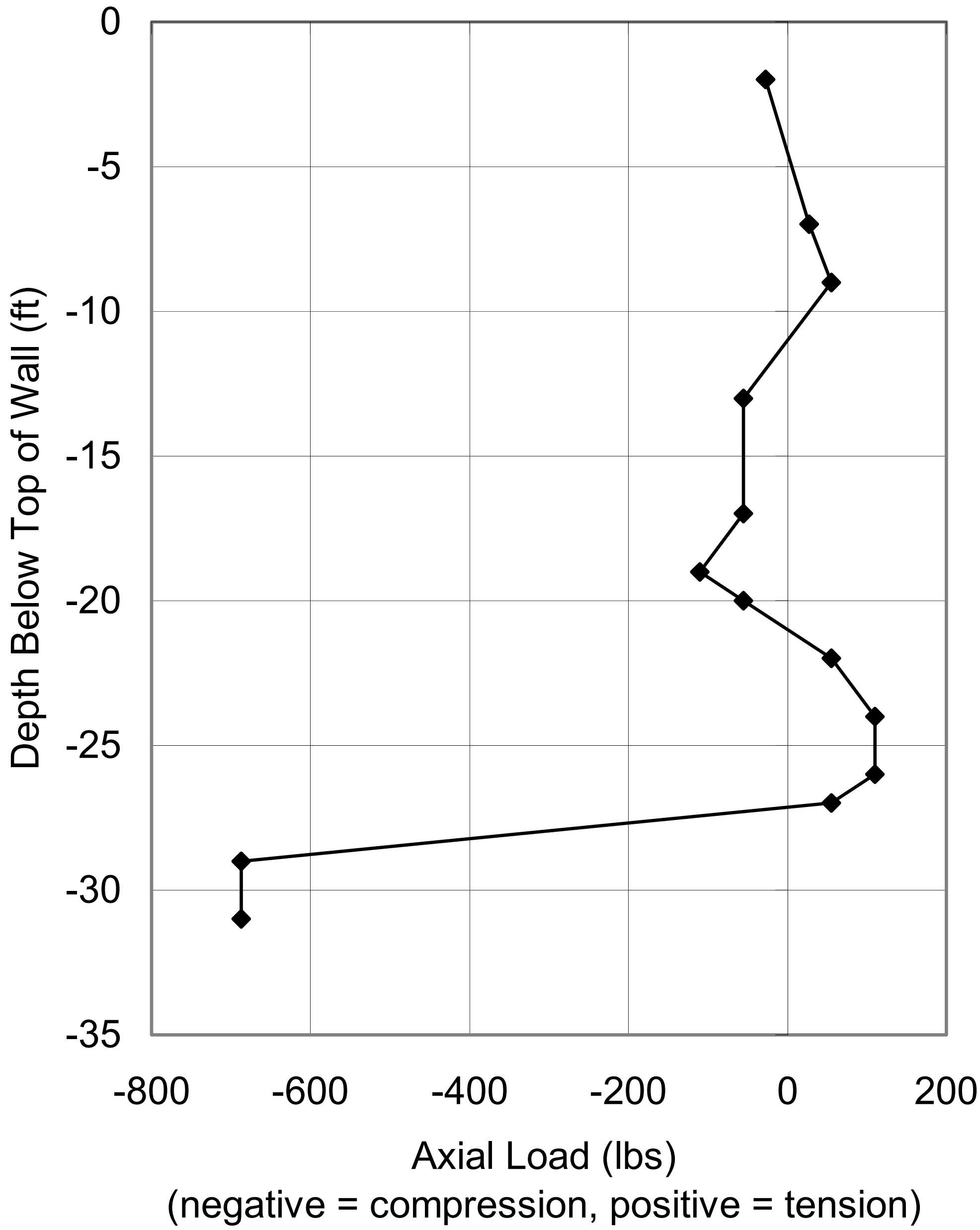


Figure 5.25. Distribution of the axial load below the top of the wall from interpreted results for the section of wall with primary and intermediate reinforcement.

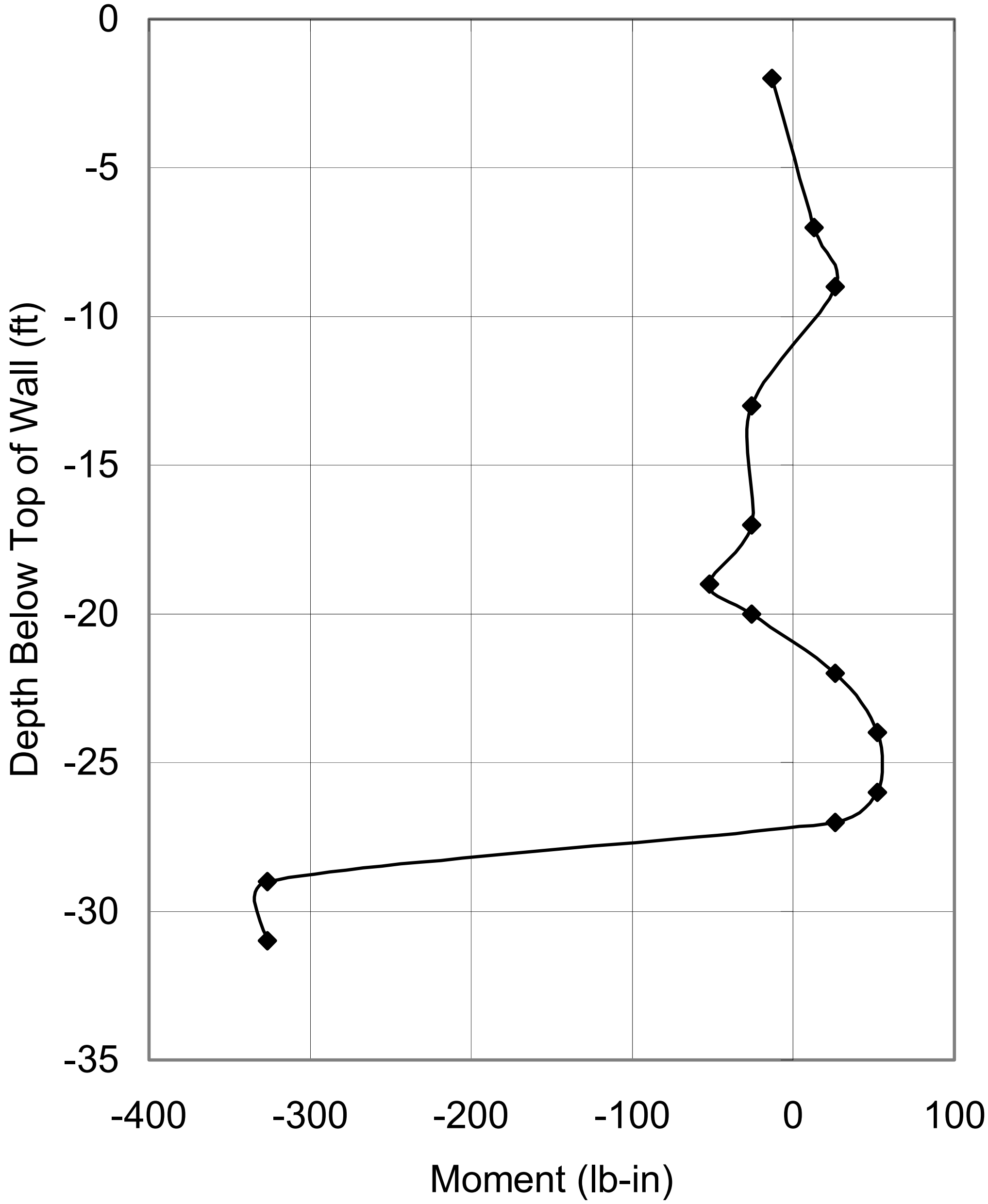


Figure 5.26. Distribution of the moment below the top of the wall from interpreted results in the section with primary and intermediate reinforcement.

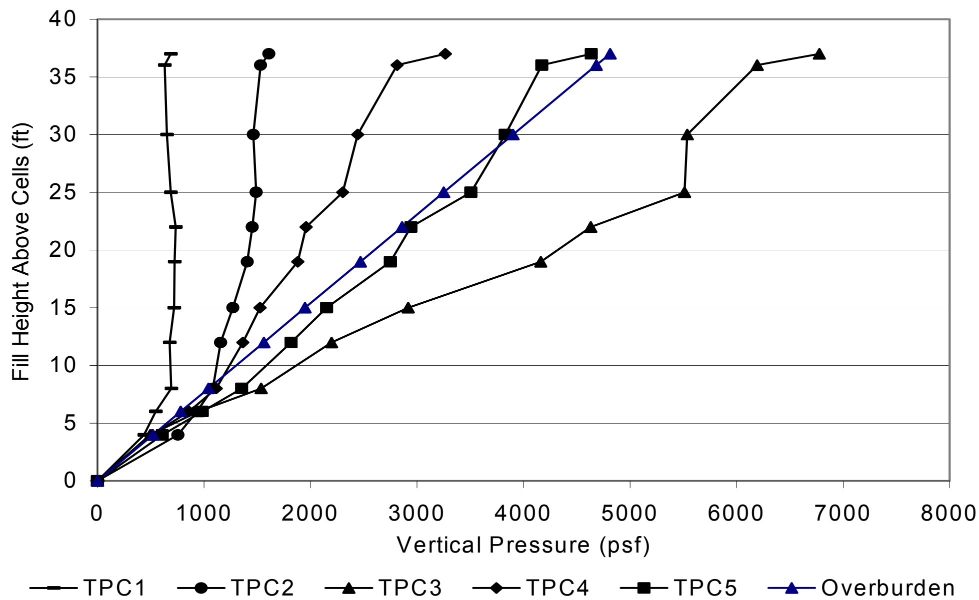


Figure 5.27. Measured vertical wall pressures for different height of fill above the total pressure cells beginning at 6 ft within the wall backfill.

As shown in the figure, only one of the pressure cells (TPC5) placed at 30 ft (9.14 m) from the wall face indicated values that approximate the assumed values. The measured base pressure distribution with distance from the face of wall is plotted for different heights of fill above the cells as shown in Figure 5.28. The two cells installed closest to the face of the wall indicated low readings. Similar observations on measured base pressures have been reported in literature for instrumented reinforced soil walls (Sampaco, 1996).

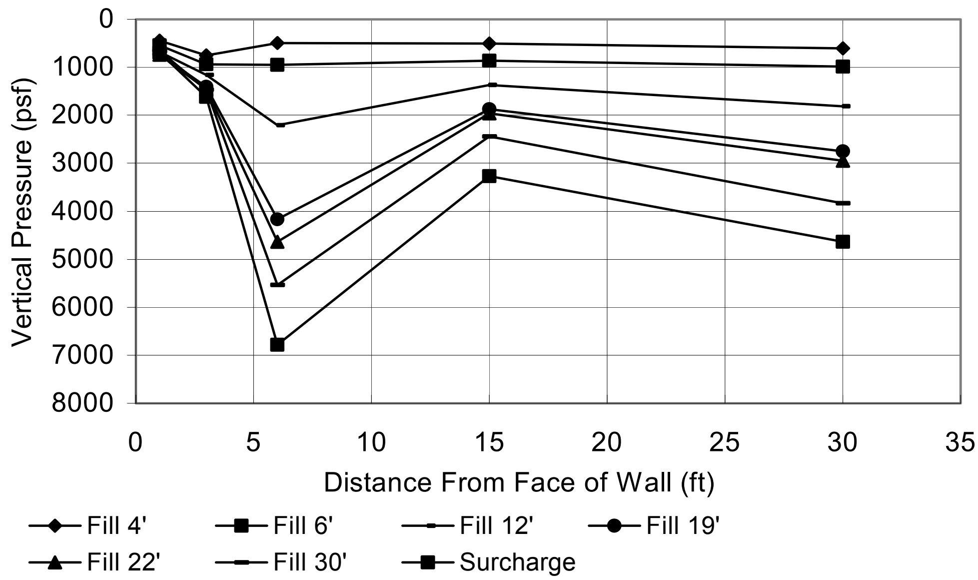


Figure 5.28. Plot of vertical pressure for different heights of fill above the pressure cells.

5.3 Vertical and Horizontal Deformations

5.3.1 Vertical and Horizontal Inclinometers

Horizontal movement in the wall foundation soils was measured with vertical inclinometers. As indicated in Chapter 4, these vertical inclinometers were placed inside and outside the wick drain limits to see how the horizontal movement in the various soil stratums was effected with and without radial draining.

Vertical inclinometer I1 shown in Figure 5.29, and inclinometer I2 shown in Figure 5.30 indicate significant movement in the upper clay layer. This movement may be attributed to the consolidation of the upper clay layer. As soft clay consolidates, the inclinometer casing appears to be buckling and moving away from the wall. During the reading taken 22 Dec 1999, the inclinometer lowered into casing I1 would not advance beyond 50 ft (15.2 m) below the top of the inclinometer casing. This indicated that the

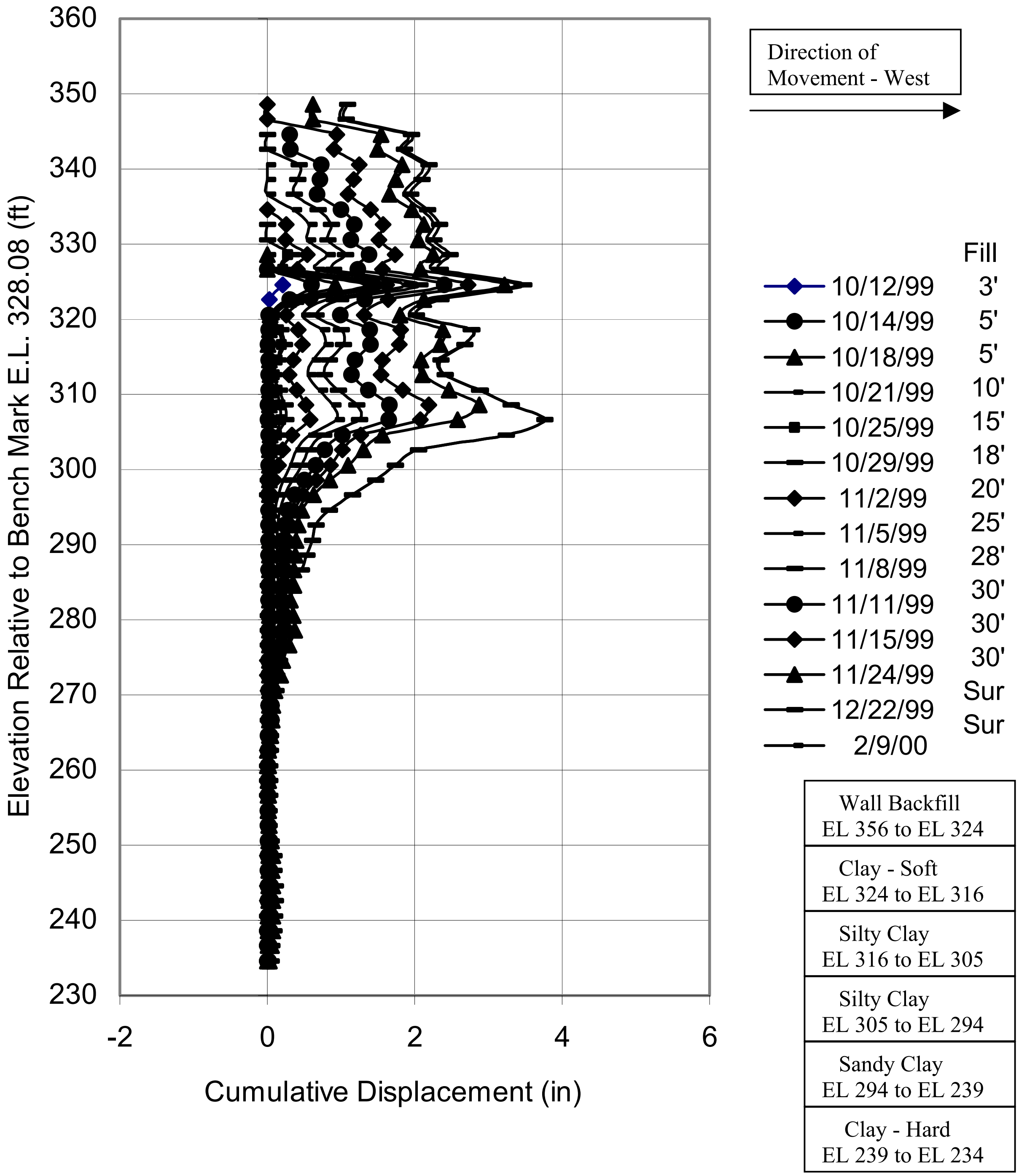


Figure 5.29. Movement of various soil stratums as indicated by inclinometer I1. (Plan view shown on Figure 4.5.)

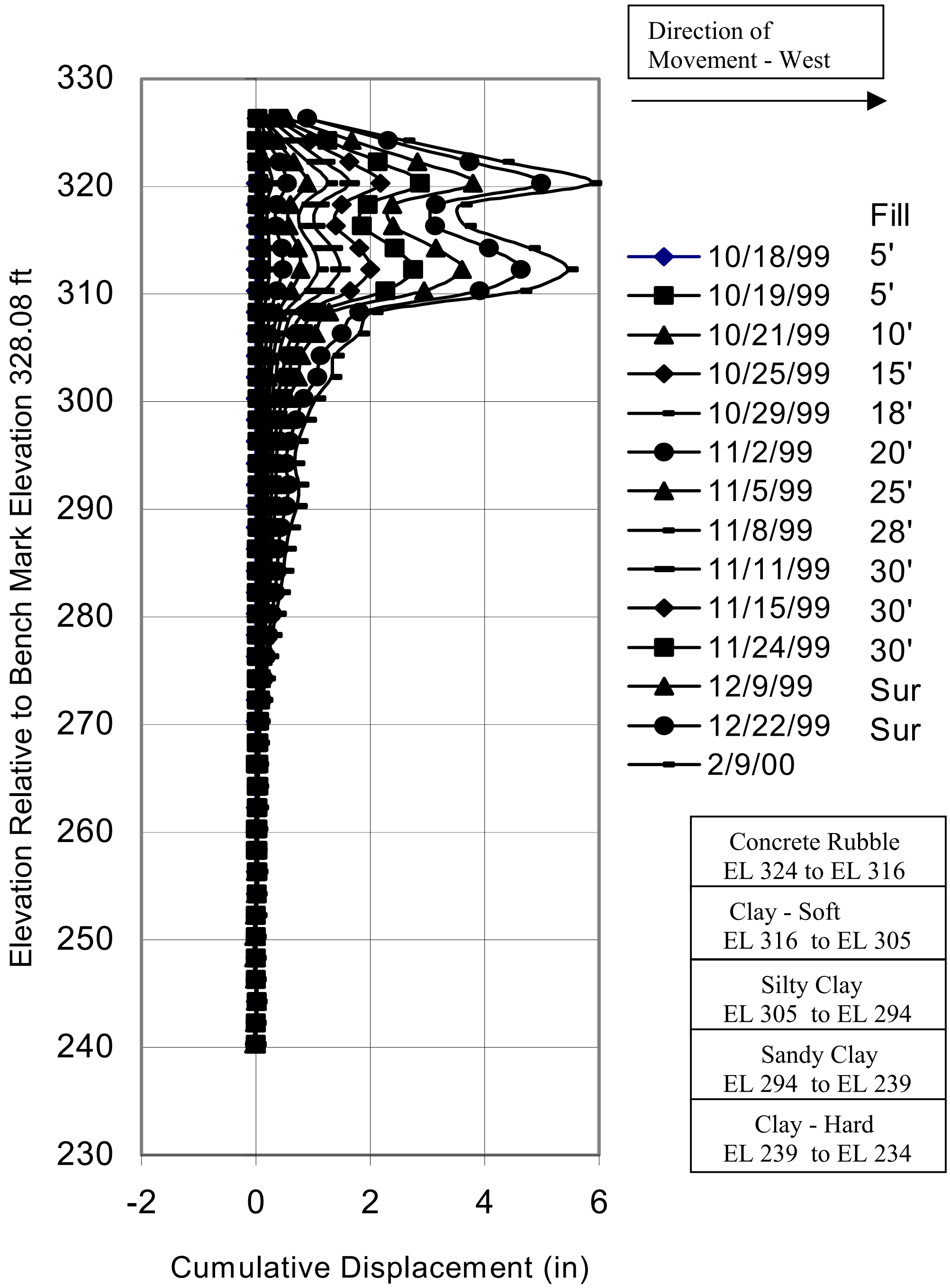


Figure 5.30. Movement of various soil stratums as indicated by inclinometer I2. (Plan view shown on Figure 4.5.)

casing could possibly have sheared or displaced too much, not allowing the inclinometer probe to advance any further. The original boring log taken during drilling indicated that a telescoping inclinometer section was installed at this depth to compensate for settlement. These telescoping inclinometer sections have been known to fail in cases where the horizontal displacement is large. This is the most likely scenario, which caused the inclinometer probe not to advance further. At this same depth inclinometer I2 showed about 5 inches (127 mm) of horizontal movement in the soil.

Inclinometer I3 was placed outside the wick drain limits and the movement was considerably less than I1 and I2. Figure 5.31 shows the movement of inclinometer I3. As seen in the figures, Inclinometer I1 shows a maximum displacement on the order of 4 inches (102 mm) throughout most of the layers of soft clay and silty clay beneath the wall backfill. Inclinometer I2 shows a maximum displacement of approximately 6 inches (152 mm), again occurring in the soft clay layers directly beneath the backfill. Inclinometer I3, as mentioned, shows much less displacement, on the order of 0.5 inches (12.7 mm) at the original ground surface (Elev. 327 ft) and decreasing almost linearly to zero deflection at a depth of 25 ft (7.62 m) below the ground surface. However, the movement at about 20 ft (6.1 m) below grade between the dates of December 22, 1999 and February 9, 2000 was more significant than any past reading taken at that depth. This movement may have been attributed to the placement of the surcharge, which was placed shortly before December 22, 1999. This movement also occurred at about the same depth that I1 and I2 had significant movement.

Horizontal inclinometer H1 and H2 showed vertical movement in the wall and the wall foundation. Inclinometer H1 was placed in the foundation fill and tracked the total settlement of the wall. The results of measurements at inclinometer H1 are presented in Figure 5.32. The face of the wall begins at about 14 ft (4.27 m) from the initial measurement point.

The elevation of the initial measurement point of H1 was about 326.81 ft (99.61 m) as given by the readings taken by the Utah Department of Transportation, Research Division. According to these surveys, that point has not settled, so settlement baseline adjustments were not needed.

Inclinometer H2 was placed in the wall backfill at a height of about 8 ft (2.44 m) as shown in Figure 4.20. Since the initial measurement point of H2 settled with the wall, an elevation measurement was taken during each reading. Figure 5.33 shows the vertical movement of H2.

The wall face has settled 1.6 ft (0.49 m) from the initial elevation. H2 indicates that the wall settlement is decreasing into the wall, showing that the wall is rotating toward the wall face. The angle of rotation as shown by H2 is about 3 degrees. The overall settlement of H2 since the initial reading has been about 19 inches (483 mm), which is compatible with the readings taken from H1.

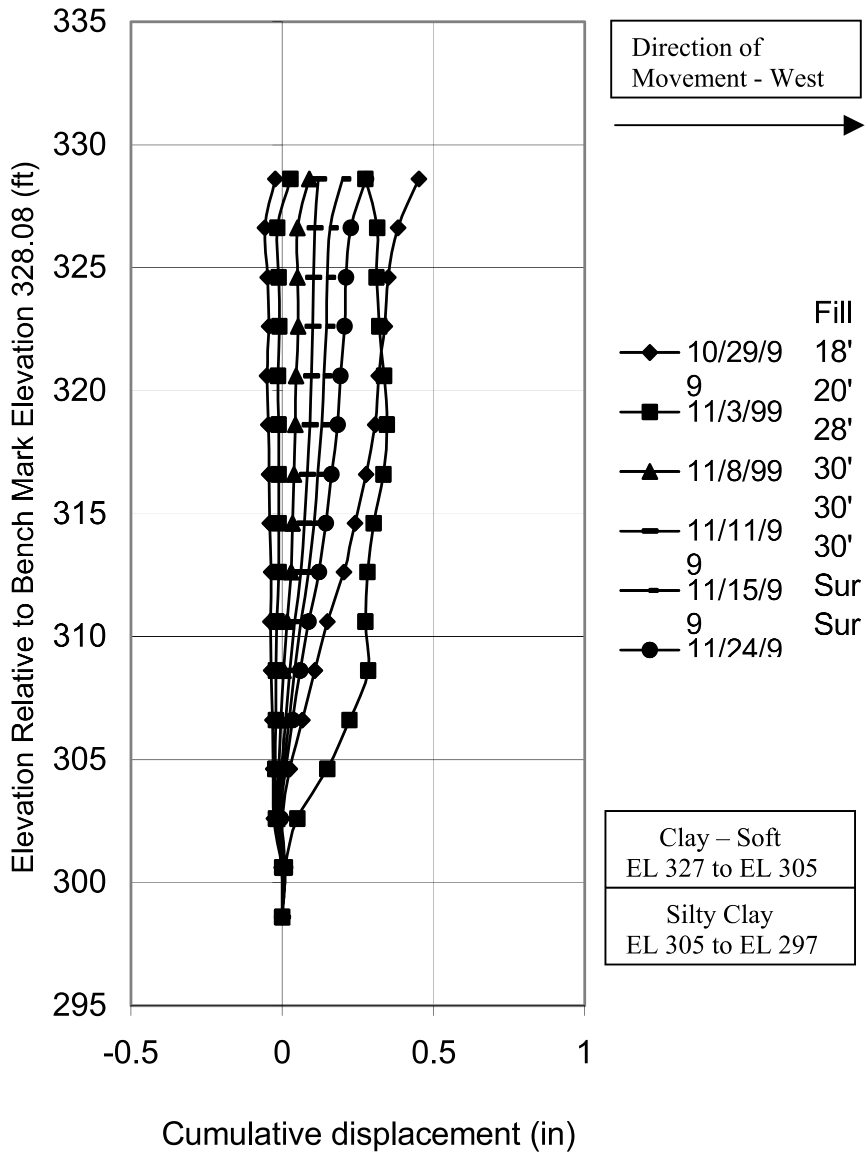


Figure 5.31. Movement of various soil stratums as indicated by inclinometer I3. (Plan view shown on Figure 4.5.)

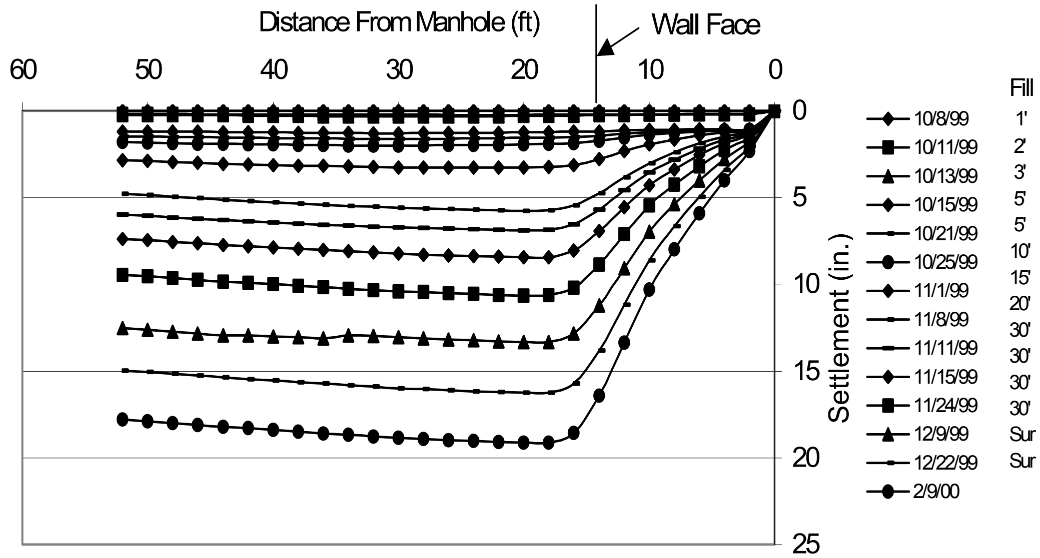


Figure 5.32. Movement of horizontal inclinometer H1 originating from a manhole and going beneath the wall face at about 14 ft.

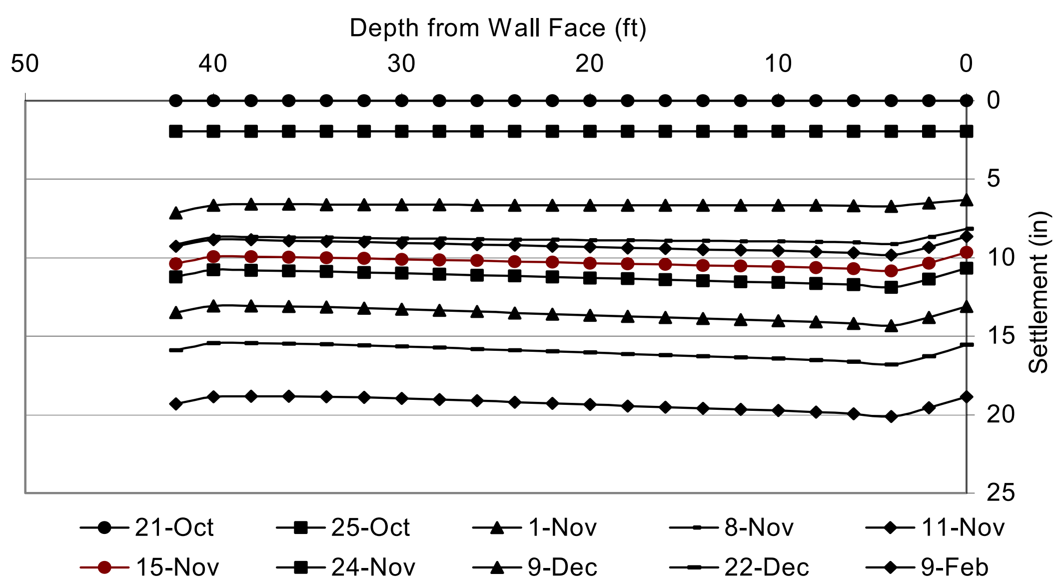


Figure 5.33. Horizontal inclinometer H2 beginning at an initial height of 8 ft in the wall fill and originating at the wall face.

5.3.2 Horizontal Extensometers

The horizontal extensometers were placed in the two different instrumented sections of the wall, with each section containing 30 extensometers. The results of horizontal deflection performed in the section of wall with primary and intermediate reinforcement are represented in Figure 5.34 and the results of measurements in the section of wall with only primary reinforcement are presented in Figure 5.35.

As seen in these figures, there was a fairly linear increase in wall deflection starting at the top of the wall down to approximately 15 ft (4.57 m) below the top of the wall. At this point, deflections remained fairly constant down to the base of the wall. Thus, though translations on the order of 4 to 5 inches (100 to 125 mm) were common, it does not appear from these measurements that noticeable rotation is taking place. Also, it is noted that movements are fairly uniform with respect to position within the wall. For example, the displacement 20 ft (6.1 m) below the top of the wall measured by the extensometer positioned 1 ft (0.305 m) into the wall is nearly identical to the extensometer at the same distance from the top of the wall yet positioned 8 ft (2.44 m) or 16 ft (4.88 m) into the wall. Thus, the wall appears to be moving as a rigid body, with very little deformation within the wall itself.

5.3.3 Sondex Settlements

Three Sondex tubes were installed similar to the installation of the vertical inclinometers. Three borings were done for the placement of the Sondex tubes, and after installation, the instruments were each grouted with bentonite. The grout mixture used may have been too stiff, causing the Sondex tubes to behave as a rigid block. Two of the

Sondex tubes were placed inside the wick drain limits to measure the settlement behavior at different locations due to radial draining.

Sondex tube S1is located about 3 ft (0.914 m) inside the wall footprint. The soil profile for this instrument is shown in Figure 5.36. Deflections measured in Sondex tube S1 are presented in Figure 5.37. This plot represents the amount of settlement at the bottom of each soil layer since the initial reading was taken. Figure 5.38 gives the strain vs. depth for Sondex Tube S1. The soft clay stratum in S1 has experienced about 0.63 ft (192 mm) of settlement since the initial reading was taken. The soft silty clay layer settled about 0.3 ft (91.4 mm). The sandy clay layer was broken into two different strata to separate the stiff and hard layers. The stiff layer settled about 0.15 ft (45.7 mm), and the hard layer settled about 0.1 ft (30.5 mm). The overall cumulative settlement of the natural soils was about 1.20 ft (366 mm). Settlement of the hard clay layer at the bottom of S1 could not be measured as the fill height progressed because the length of the 100 ft (30 m) Sondex probe cable was too short. However, during the period that measurements could be made, this hard clay layer had settled less than 0.5 inches (12.7 mm).

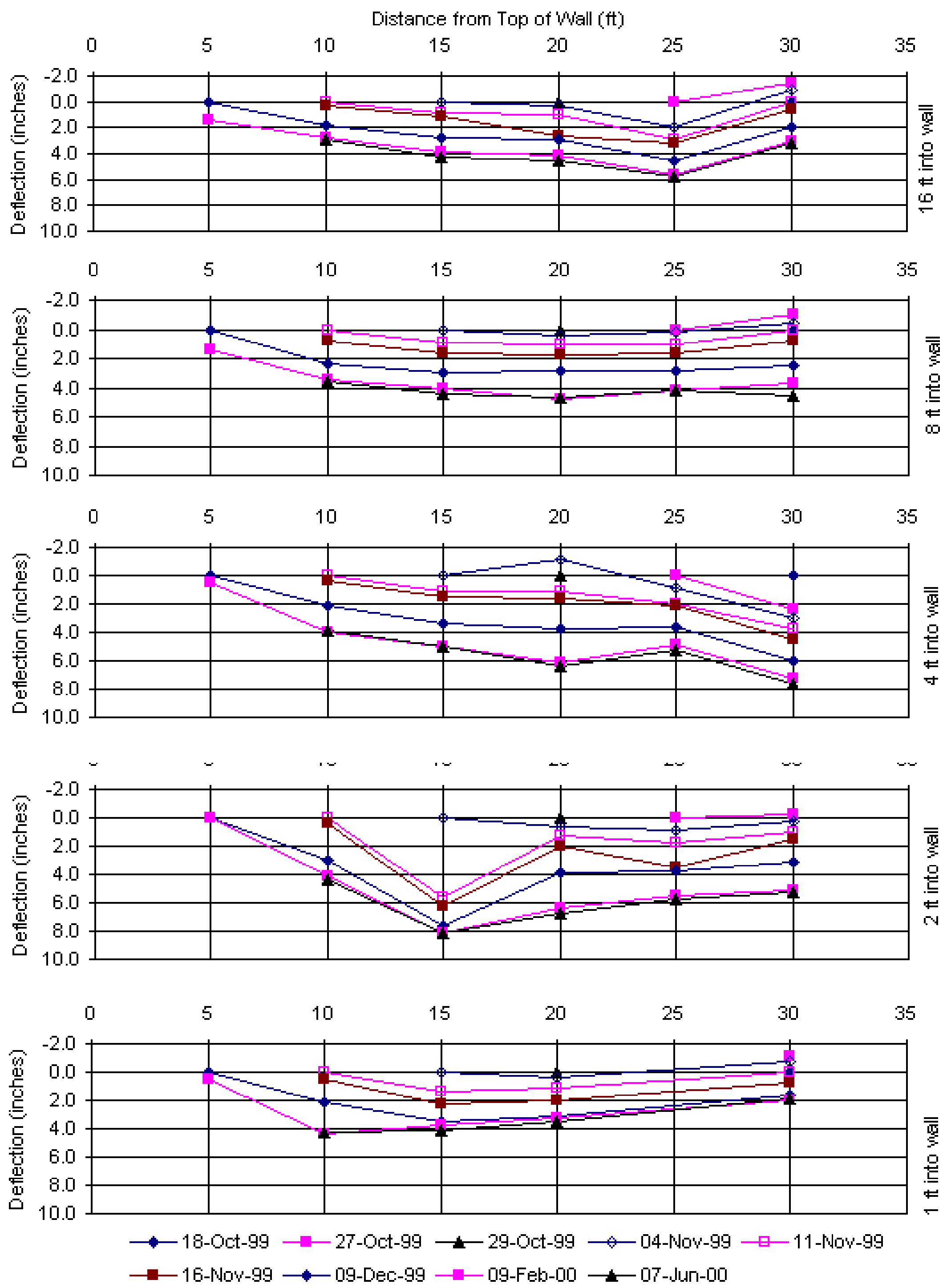


Figure 5.34. Horizontal extensometers located in the instrumented section of wall with primary and intermediate reinforcement.

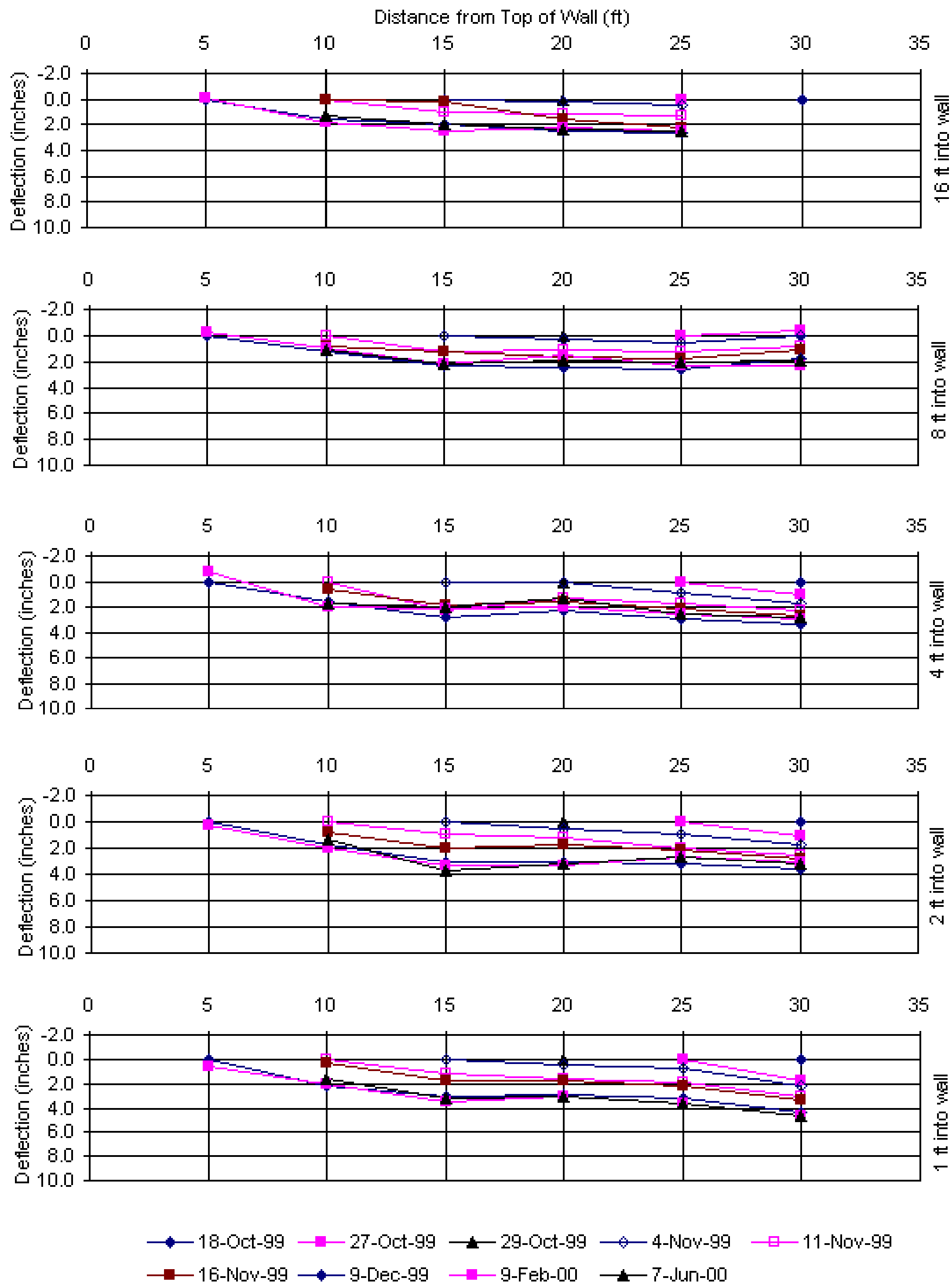


Figure 5.35. Horizontal extensometers located in the instrumented section of wall with primary reinforcement only.

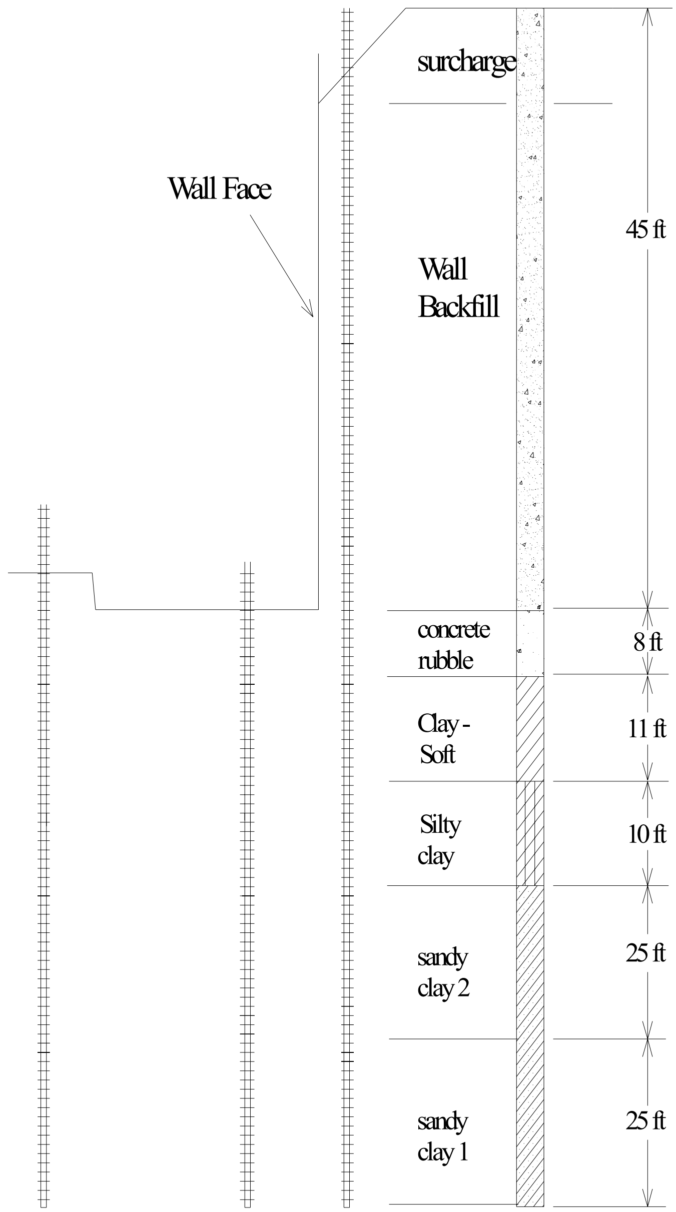


Figure 5.36. Soil stratum monitored for settlement in Sondex tube S1.

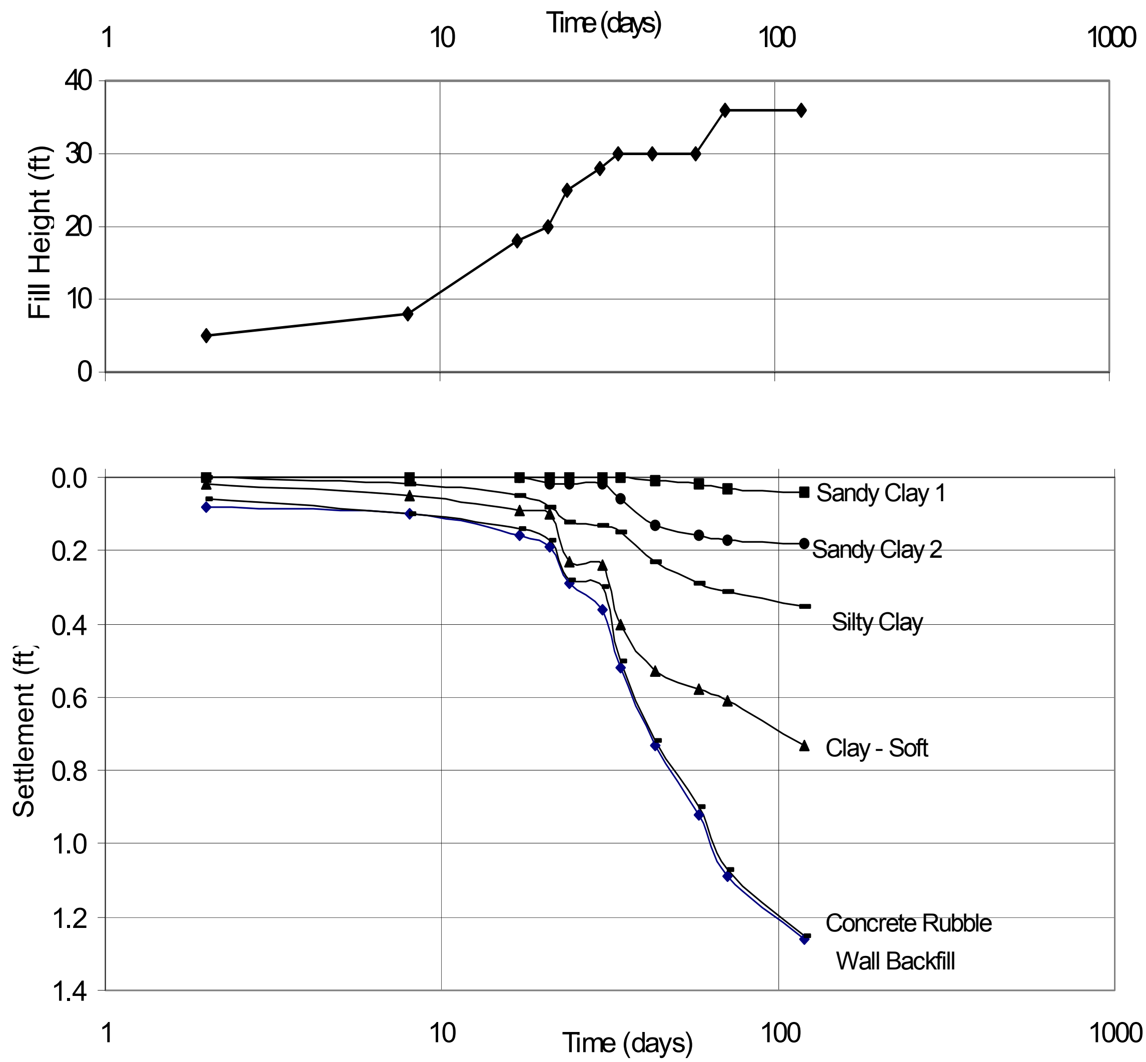


Figure 5.37. Plotted settlements for Sondex tube S1 relative to the bottom of soil strata defined in Figure 5.36 with corresponding fill heights.

Sondex Tube S2 was installed about 8 ft (2.44 m) outside the wall footprint and inside the wick drain limits. It also exhibited considerably less settlement than that of Sondex Tube S1. The soil profile for this instrument is shown in Figure 5.39. Deflections measured in Sondex tube S2 is presented in Figure 5.40. This plot represents the amount of settlement at the bottom of each soil layer since the initial reading was taken. Figure 5.41 gives the strain vs. depth for Sondex Tube S2. The soft silty clay layer that is 19 ft (5.79 m) to 30 ft (9.14 m) below grade has so far settled around 0.05 ft (15.2 mm) as compared to S1, which settled about 0.6 ft (183 mm). The stiffer sandy clay layer, 30 ft (9.14 m) to 80 ft (25.9 m) below grade, has experienced about 0.1 ft (30.5 mm) of settlement. Measurements on the hard clay layer at the bottom of Sondex tube S2 were possible because the depth of S2 was not deeper than 90 ft (27.4 m). Settlements in this hard clay stratum were found to be negligible.

Sondex Tube S3 was installed about 31 ft (9.45 m) outside the wall footprint and is outside the wick drain limits. The soil profile for this instrument is shown in Figure 5.42. Deflections measured in Sondex tube S3 are presented in Figure 5.43. This plot represents the amount of settlement at the bottom of each soil layer since the initial reading was taken. Figure 5.44 gives the strain vs. depth for Sondex Tube S3.

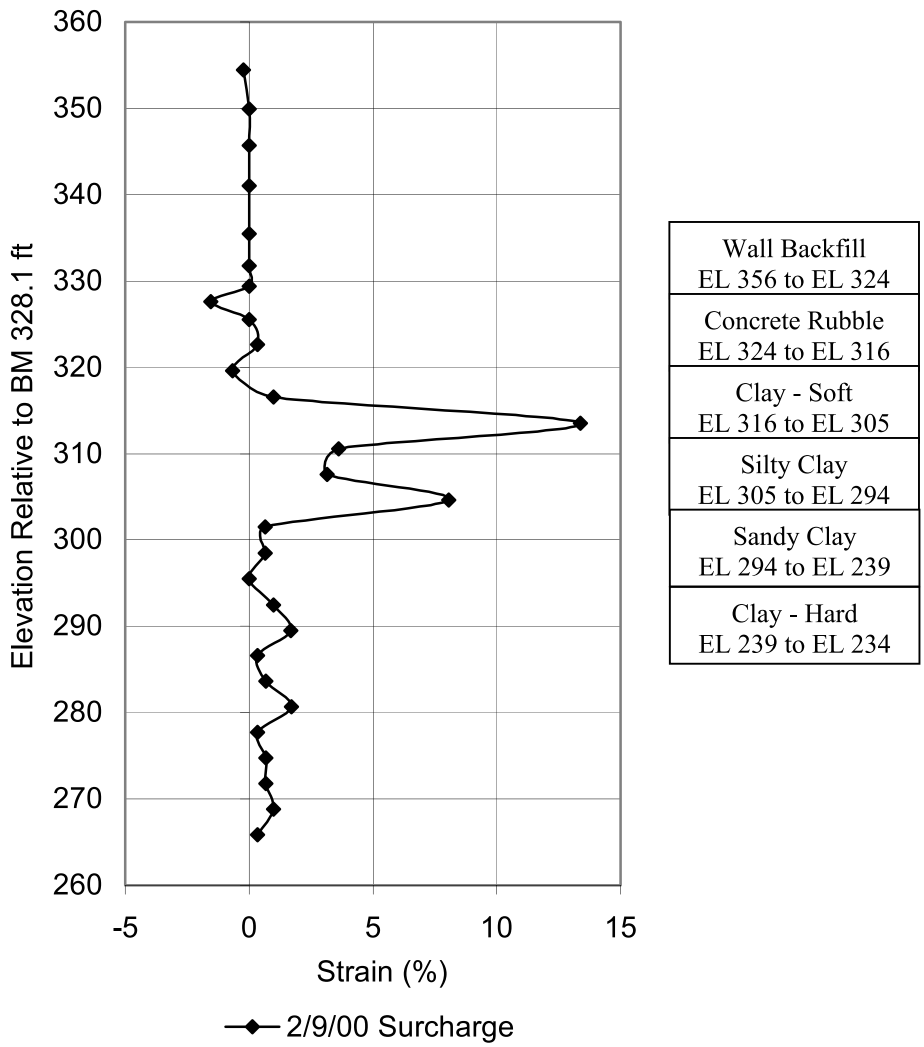


Figure 5.38. Plotted strain vs. elevation for soil stratums in Sondex tube S1.

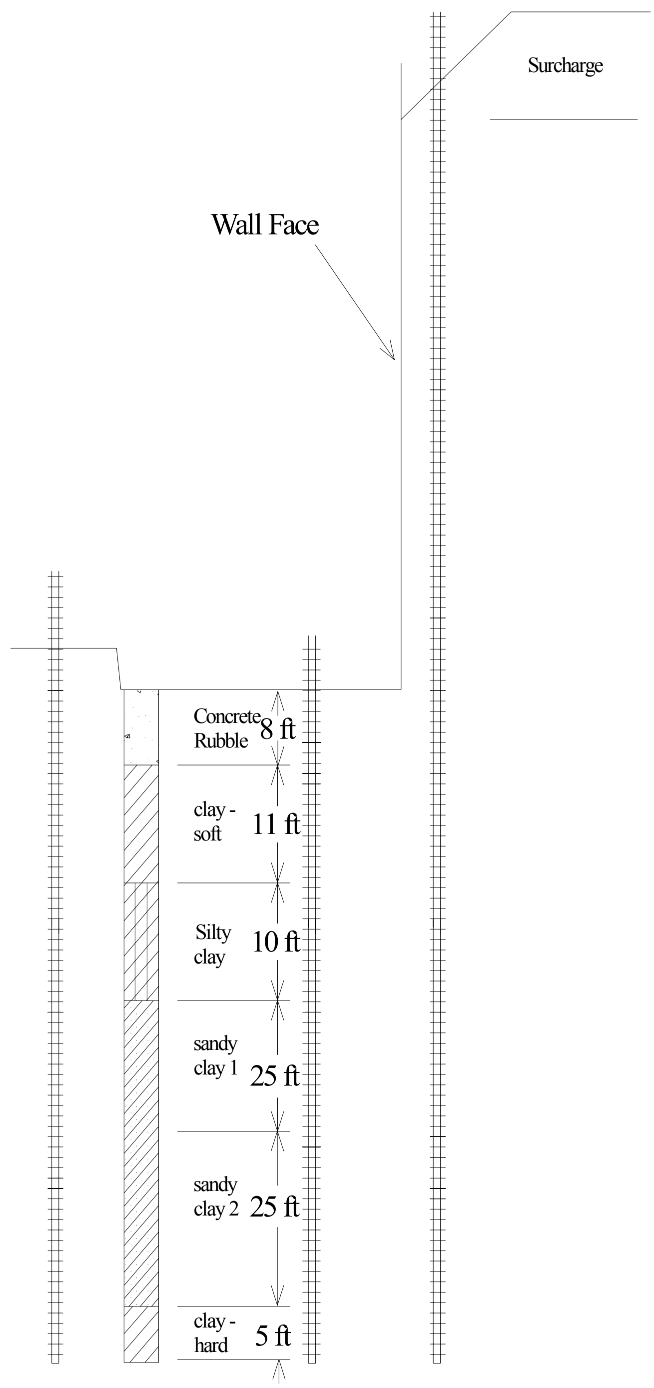


Figure 5.39. Soil stratum monitored for settlement in Sondex tube S2.

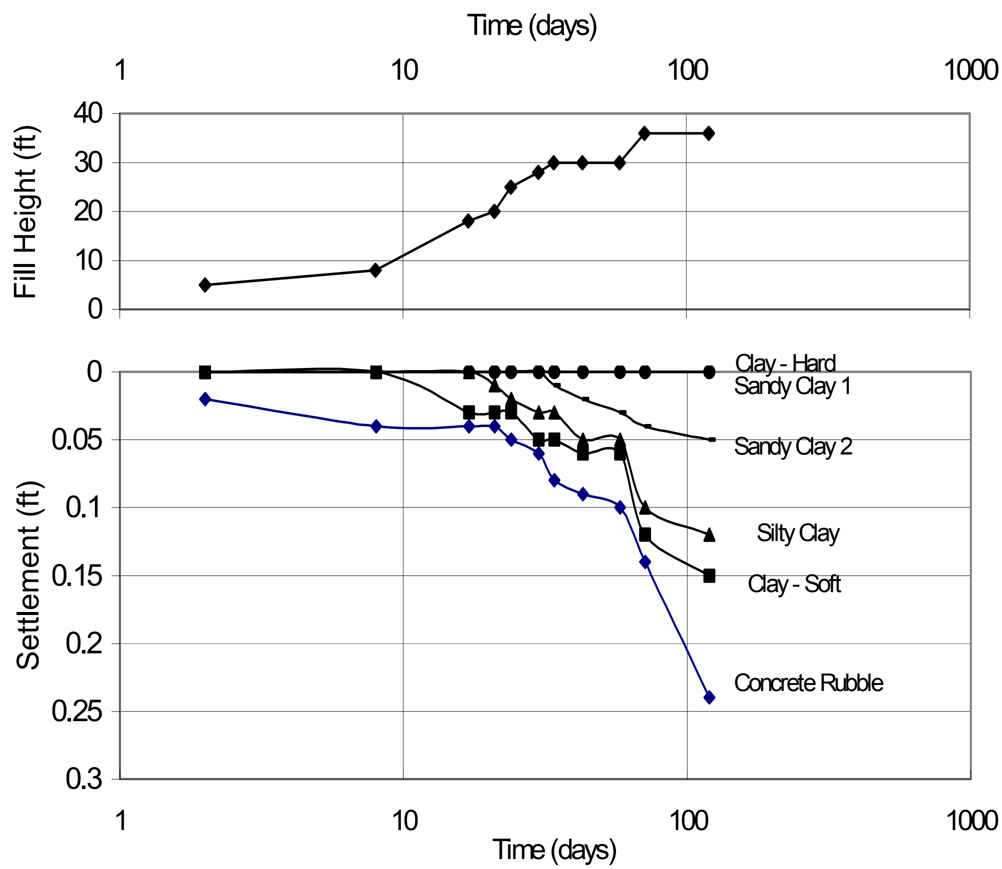


Figure 5.40. Plotted settlements for Sondex tube S2 relative to the bottom of soil strata defined in Figure 5.39 with corresponding fill heights.

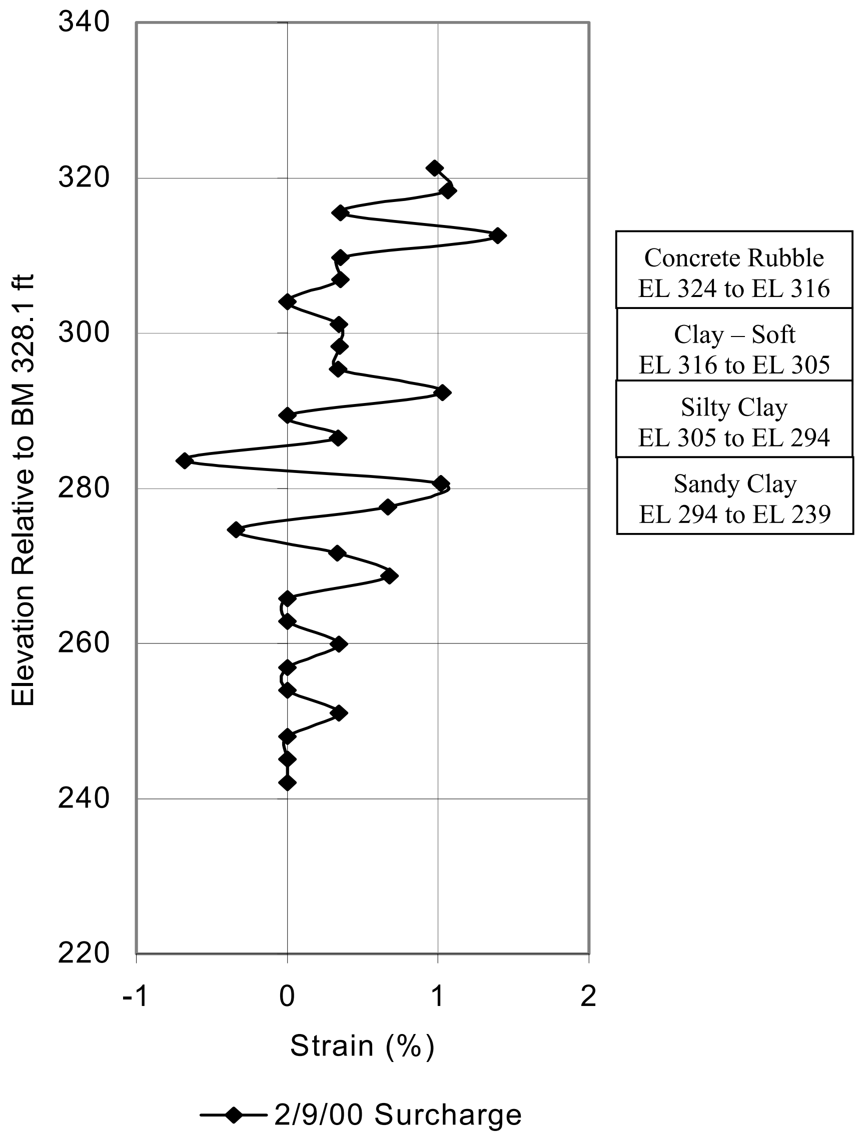


Figure 5.41. Plotted strain vs. elevation for soil stratums in Sondex tube S2.

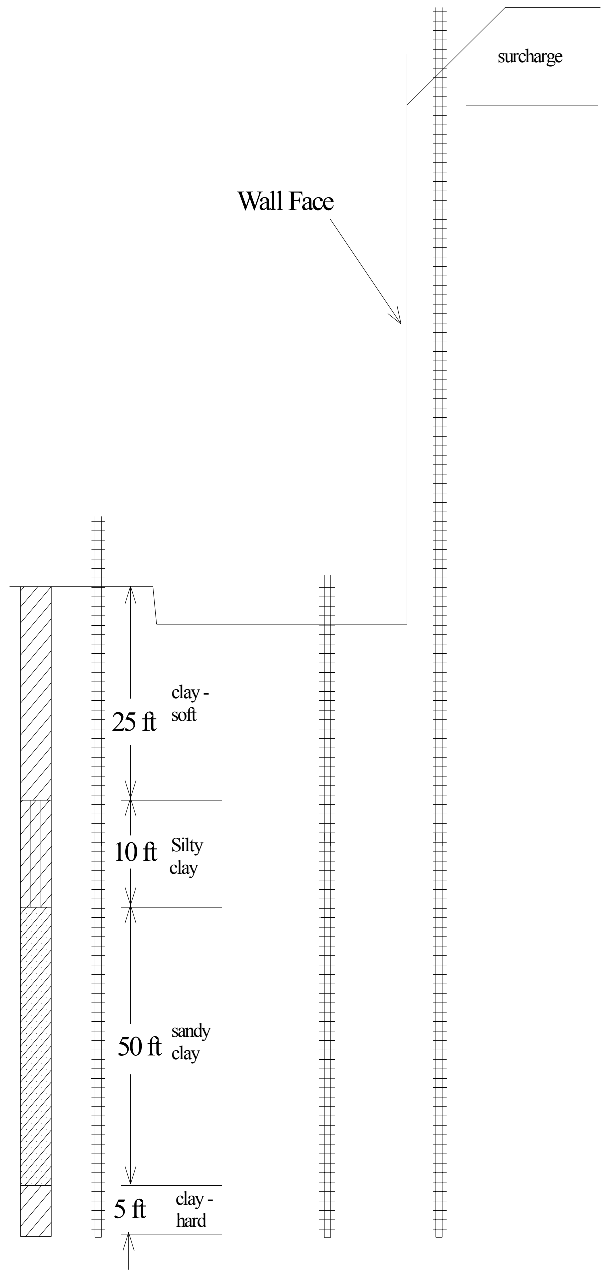


Figure 5.42. Soil stratum monitored for settlement in Sondex tube S3.

5.3.4 Settlement of Survey Monuments

Installation and monitoring of the survey monuments began on October 7, 1999. The survey monuments were all referenced from benchmark that was given an elevation of 328.08 ft (100.00 m) by the Utah Department of Transportation, Research Division. As shown in Figure 5.45, there were slight variations in the readings, which is typical in elevation reading. Monument 10 showed the most movement, which was about 16 inches (0.41 m). This is reasonably consistent with horizontal inclinometer H1 and H2.

5.3.5 Deformation of Wall Face

Shortly after construction of Wall R-346-1C, the toe of the wall began to deform in the section of wall with only primary reinforcement. This similar type of bulge was observed in other MSE walls built on the I-15 project before the intermediate mats were added. Fascia panels 14 through 16 appeared to have the largest deformation, so 17 points were chosen so the wall movement could be monitored. In addition to this section of wall, three points on panel 28, which is located in the section of wall with primary and intermediate mats, were also monitored. This was done to compare the amount of movement that occurs between the two sections. Figure 5.46 shows the movement of panels 14 through 16 as fill was placed on the wall. The maximum amount of movement observed in panel 15 was about 4 inches (102 mm). In comparison, Figure 5.47 represents panel 28, which contained intermediate and primary reinforcement mats, where the maximum amount of movement was 2.5 inches (63.5 mm).

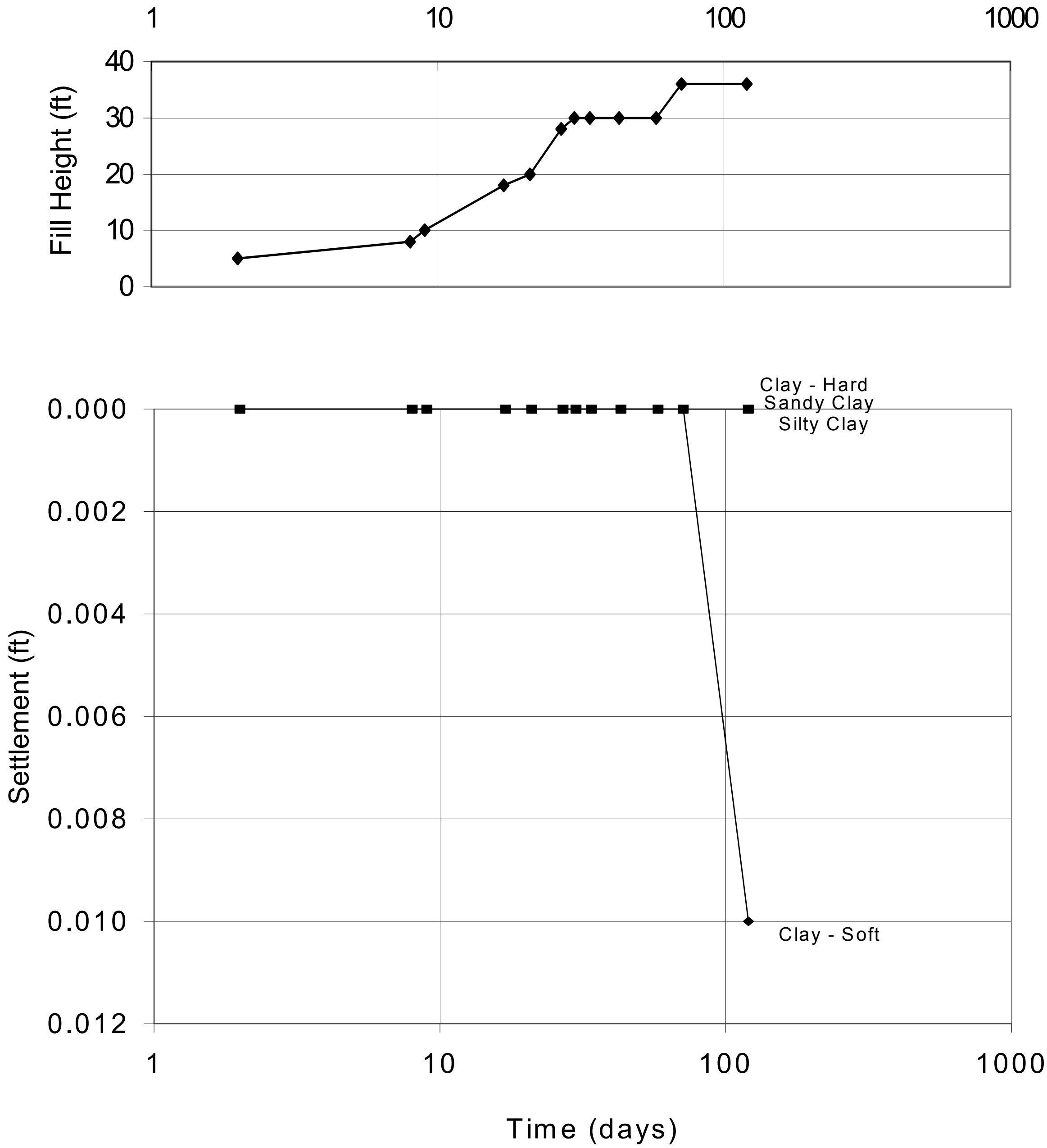


Figure 5.43. Plotted settlements for Sondex tube S3 relative to the bottom of soil strata defined in Figure 5.42 with corresponding fill heights.

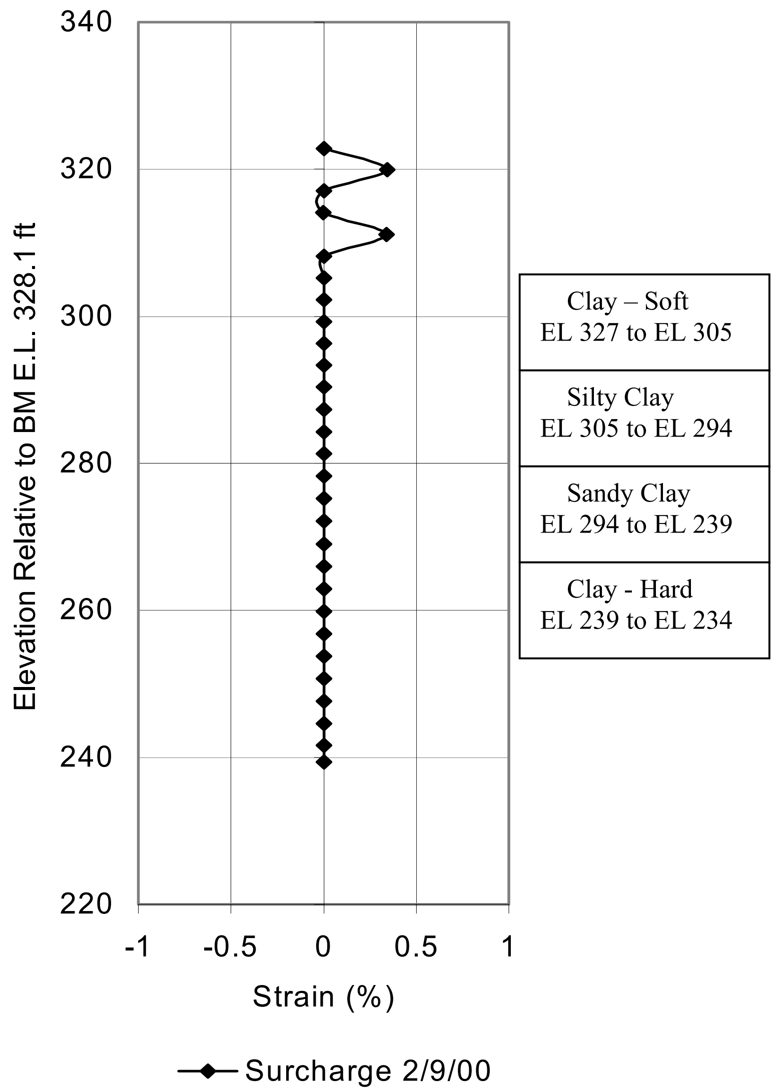


Figure 5.44. Plotted strains vs. elevation for soil stratums in Sondex tube S3.

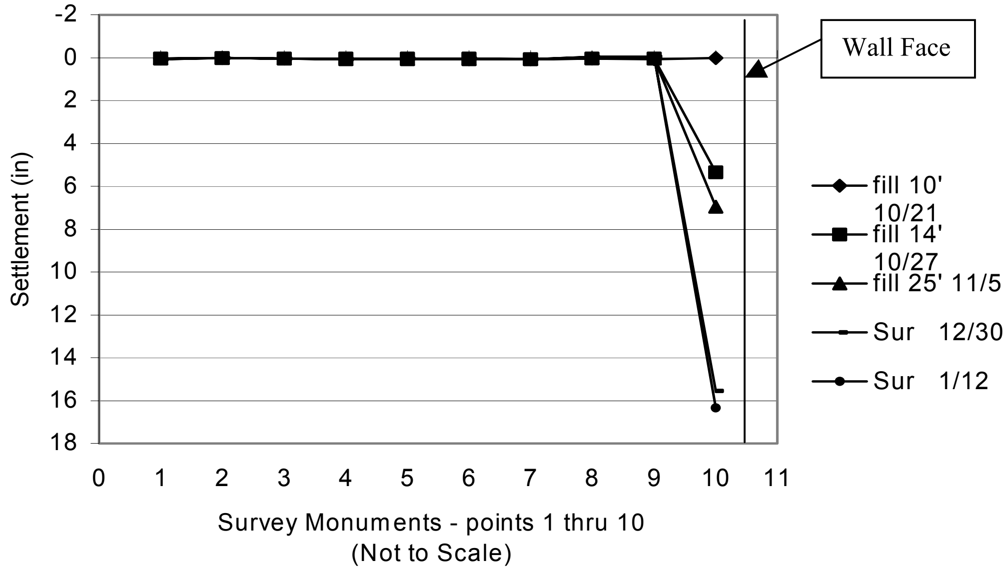


Figure 5.45. Plot showing movement of 10 survey monuments.

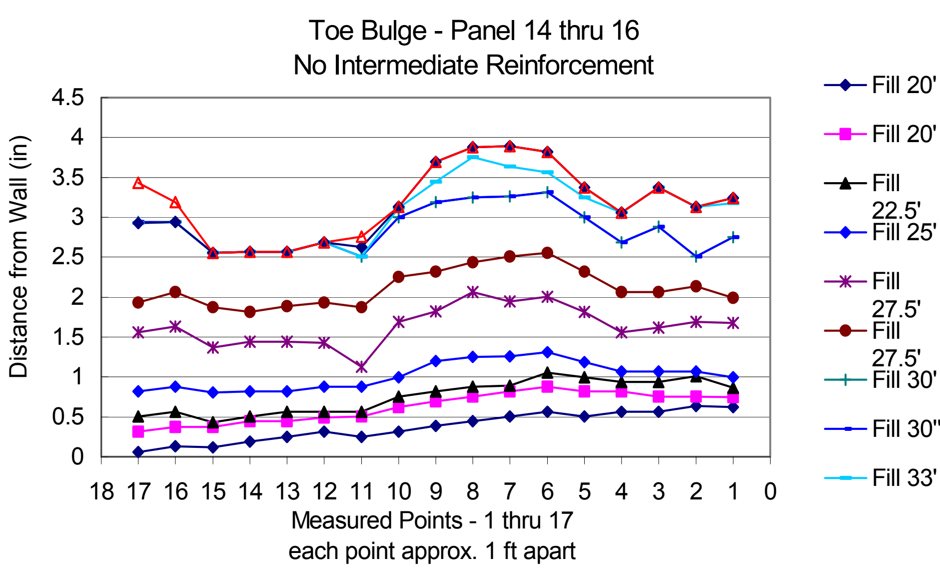


Figure 5.46. Movement of toe bulge in fascia bar mats 14 through 16.

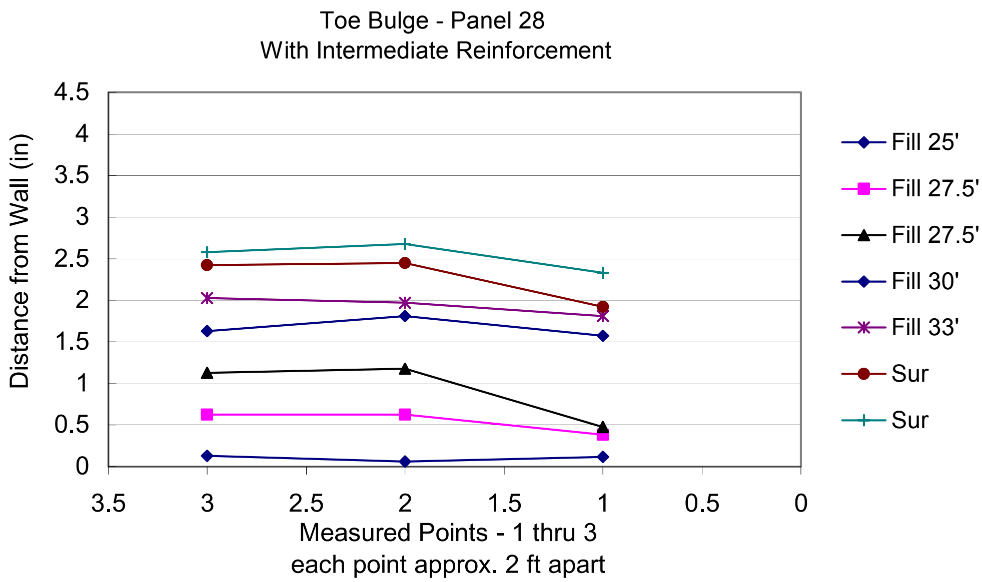


Figure 5.47. Movement of toe bulge in fascia bar mat 28.

5.3.6 <u>Overall Deformation</u>

Figure 5.48 demonstrates the overall deformations and movement in the wall. The vectors show the direction and magnitude of movement. The horizontal movement was taken from the horizontal extensometers. The vertical movement was taken from both horizontal inclinometers and Sondex tubes.

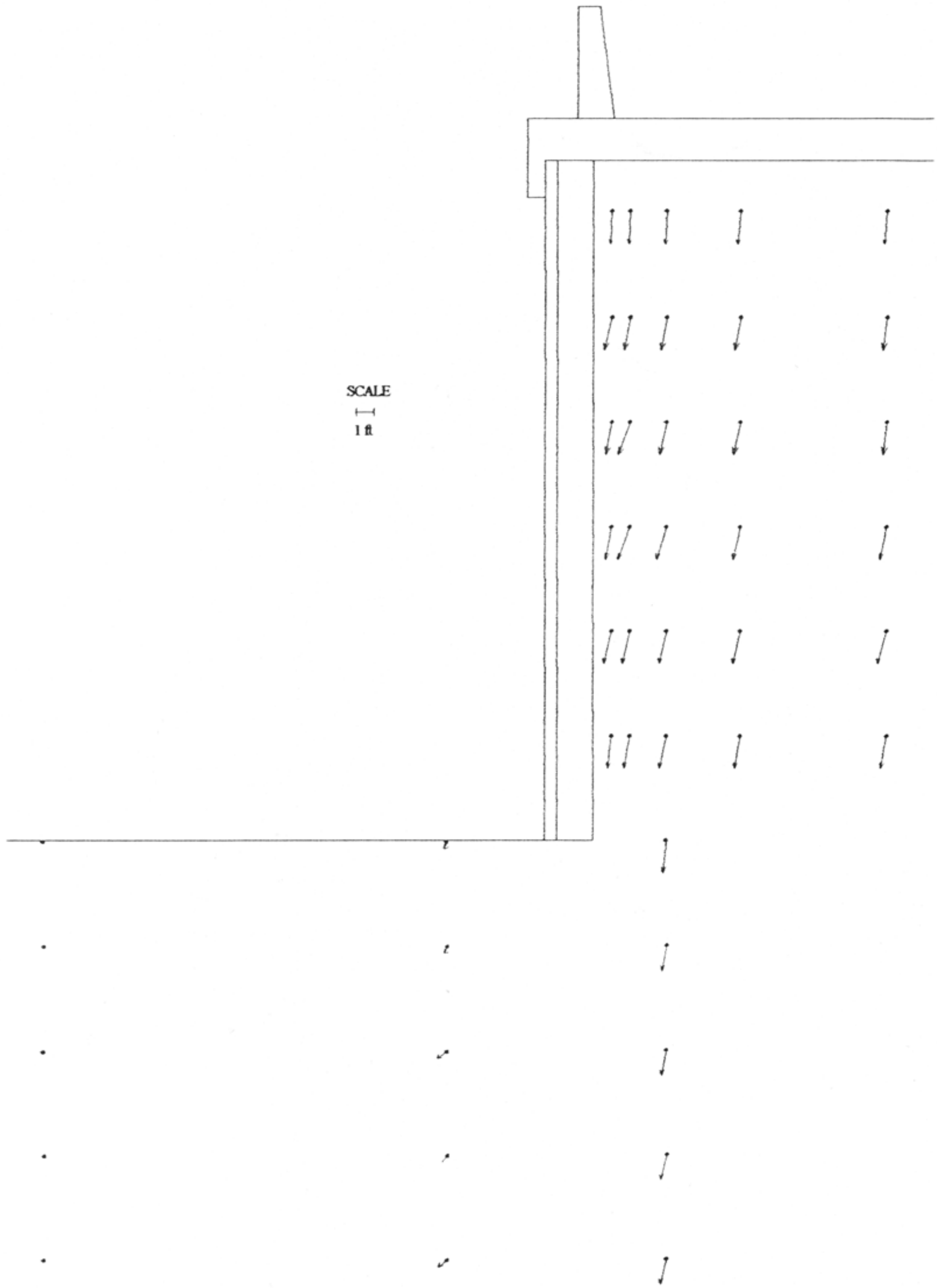


Figure 5.48. Vectors showing overall horizontal and vertical movement of Wall R-346-1C.

CHAPTER 6

INITIAL POST-CONSTRUCTION REPORT FOR FIELD BEHAVIOR OF MSE WALL R-346-1C

6.1 Introduction

In this chapter, the results of field measurements on MSE Wall R-346-1C during the first three years following wall construction are presented. The steps taken to protect the instrumentation for long-term monitoring are given, and a number of challenges that were overcome are explained. This chapter is composed in the same manner as Chapter 5, which detailed the measurements taken, the data collected, and the behavior of the wall during construction. Each of the instruments for which data was collected during construction (as given in Chapter 5) will be addressed to illustrate the post-construction changes in the wall and any changes in the ability to take such measurements. As with Chapter 5, a section devoted to the forces and pressures within the wall is presented first (Section 6.2), followed by a section devoted to deformations within the wall and the foundation soils (Section 6.3).

6.2 Forces and Pressures

6.2.1 Bar Forces in the Reinforcing Mats

A number of steps were required in order to take post-construction measurements of the forces in the reinforcing bar mats used in the construction of Wall R-346-1C. The first problem was met upon placement of the secondary stage concrete fascia panels (see Figure 6.1). The cables connected to the strain gages on the bar mats were initially between the primary stage bar mat fascia panels and the concrete fascia panels, such that the cables were inaccessible. Thus, a 6-inch (152.4 mm) hole was cored in the concrete panels at each section of the wall that was instrumented to allow access to the cables. These holes are similar to the cored hole shown in Figure 6.1, which is actually the access hole for the upper horizontal inclinometer H2.

Once the holes were cored in the concrete fascia panels and the cables pulled through, it was noted that many of the connectors had been splattered with concrete during the construction of the concrete fascia panels. After discussing the matter with a

Figure 6.1. Hole cored in secondary stage concrete fascia panel to allow access (Inclinometer H2).

number of sources (including UDOT and Intermountain Concrete Specialties), it was determined that the best method for cleaning the connectors was to soak the connectors in diesel fuel to soften the concrete, then use a brass brush to remove the concrete. This would provide minimal damage to the connector pins while allowing removal of the concrete. Several hours of work were required to clean these connectors, but the outcome was positive, with what appears to be very minimal damage to the connectors.

Once the connectors were cleaned, they were sprayed with contact cleaner to remove any remaining diesel fuel from the connector. The fuel would have eventually volatilized, but it was decided to use the contact cleaner to make sure no trace of fuel remained.

The connectors were initially labeled using a permanent marker. However, after being subject to sunlight, inclement weather, and concrete splattering during and after the construction process, the marker was beginning to fade. The connector labels were still legible, but it was decided that a more permanent label was necessary to maintain legibility for the number of years that readings would be taken. Small aluminum tags were created which were stamped with the appropriate labels and clamped to the connectors. These tags are quite permanent and inexpensive, and much more durable than the marker labels previously relied on. An example of such a tag is shown in Figure 6.2.

Once the connectors were cleaned and labeled, they were placed in weatherproof electrical boxes that were bolted to the concrete fascia panels. Several pictures of these boxes are given in Figure 6.3 and Figure 6.4. Silicone was used to seal the small gap between the concrete fascia panels and the electrical boxes, such that the connectors and cables are protected from the weather. With the connectors and cables in good condition and protected from vandalism and the elements, gage readings were taken to measure forces in the bar mats.

Figure 6.2. Aluminum tags used to label the strain gage connectors.

Figure 6.3. Views from the North and South, respectively, showing the two electrical boxes containing strain gage cables and connectors for the two instrumented sections of wall.

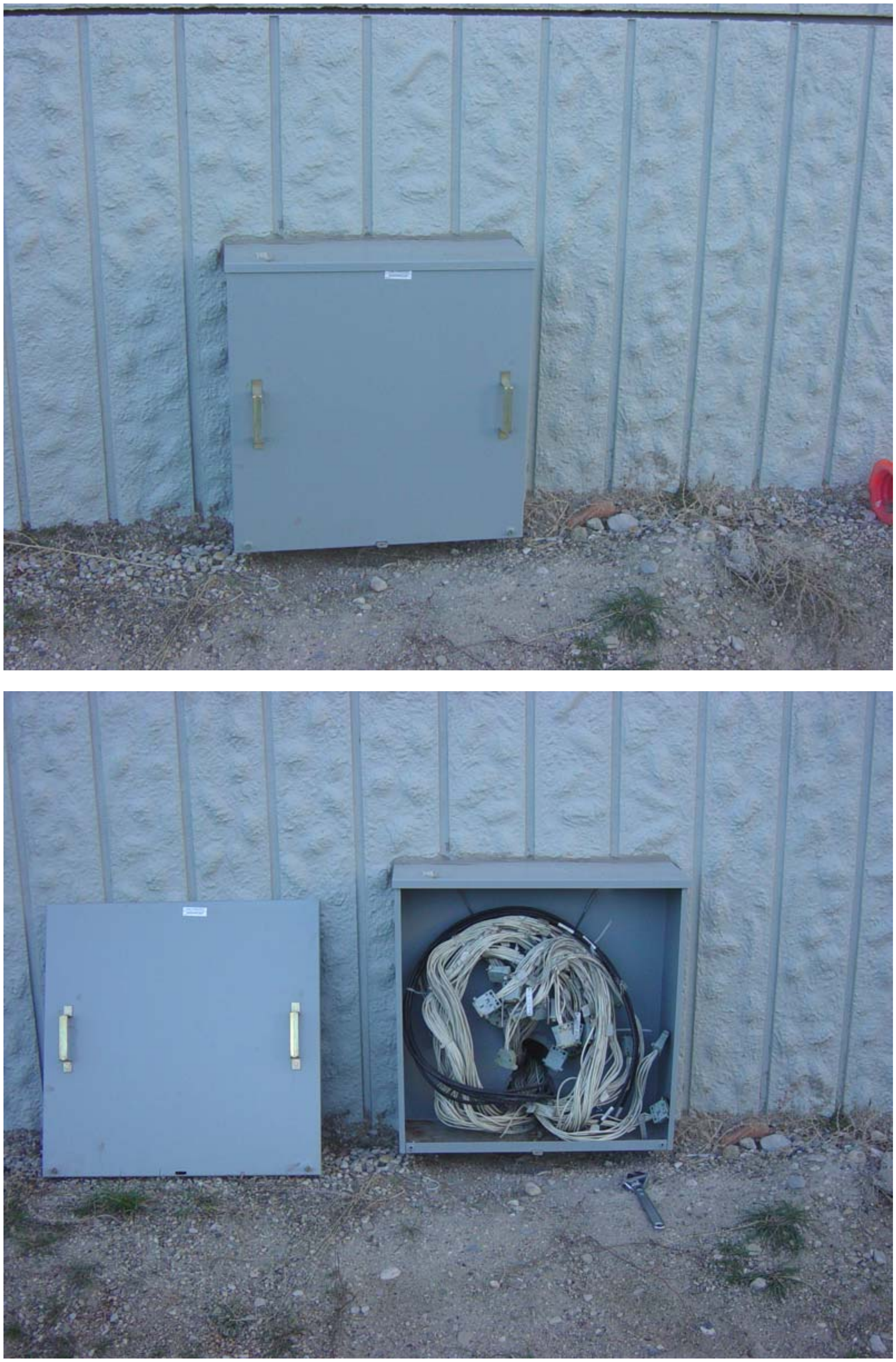


Figure 6.4. Close up views of the North box containing strain gage cables and connectors.

Strain gage readings were taken in the same manner as established in Chapter 4 of this report. Data were collected and stored using the datalogger and PC as seen in Figure 4.11. The data were processed and analyzed using the same Excel Spreadsheet used to calculate the data presented in Chapter 5. All of the strain gage data for the bar mats are contained in Appendix E.

As may be noted upon inspection of Appendix E, a number of the strain gages that were functioning near the end of construction are no longer functional. Also, for many of the gages that yielded readings the results were not credible, deviating from expected values by factors of anywhere from 2 to 20. Further investigation is required to determine whether there is a problem in the procedure followed in reading the gages, or whether there is an electrical or mechanical problem that is causing the inaccurate readings. The bar mat specimens used to calibrate the strain gages will be tested again to repeat the calibration process and determine whether or not the procedure is causing problems. If no problem is determined from that trial, the resistance for each of the strain gages will be checked to make sure the gages have maintained the proper resistance over time. Beyond that, there is not much that can be done to validate any readings taken in the future. An update on this situation will be provided in a further report.

6.2.2 Lateral Earth Pressure Coefficient, K

Since the calculation of the lateral earth pressure coefficient K is based on tension measurements in the bar mats, and since the data collected from the strain gages on the bar mats appears to be suspect (see Section 6.2.1), no additional data has been collected with respect to lateral earth pressure coefficient K. Until the problem in strain gage measurements can be determined and hopefully corrected, no additional data relating to K will be available.

6.2.3 Location of Loci of Maximum Tension

As with the lateral earth pressure coefficient, the location of potential failure lines is again dependent on the strain gage readings from the bar mats. Since these readings do not appear to be accurate (see section 6.2.1), no additional post-construction data is available at this point. Again, if the problem relating to the strain gage measurements can be determined and corrected, future data will be available. If no correction can be determined, no additional data will be obtained.

6.2.4 Loads in the Fascia Bar Mats

Presumably, the same problem relating to the strain gages in the bar mats (as discussed in Section 6.2.1) applies to the strain gages in the fascia panel mats. The data calculated from the post-construction measurements are given in Appendix G. Again, inspection of these data show the same improbable readings as mentioned in Section 6.2.1, where measured results vary from the expected results by factors of 2 to 20. Again, additional investigation will be performed in attempt to determine the cause of this deviation from expected readings.

6.2.5 Vertical Earth Pressures

The cables connected to the pressure cells were pulled through the same hole in the concrete fascia panels as the strain gage cables in order for readings to be taken (Section 6.2.1). The vibrating wire reader provided by UDOT was used to take the post-construction readings. A vibrating wire reader acquired by Utah State University was also used to take post-construction readings, and the two sets of readings are compared in this section. The vibrating wire reader purchased by USU does not measure the same thermistor as the pressure cells contain, so independent temperature readings are not possible. However, the temperature readings taken using the vibrating wire reader provided by UDOT were used to correct the pressure readings given.

Figure 6.5 and Figure 6.6 show the additional readings taken from the pressure cells using the UDOT vibrating wire reader, while Figure 6.7 and Figure 6.8 show the readings taken using the USU vibrating wire reader. A tabular comparison of the most recent set of pressure cell readings for the two vibrating wire readers is shown in Table 6.1.

As noted in comparing the two sets of data, the results from each vibrating wire reader were quite precise for each of the pressure plates that appear to be still functional. As also seen in the data, it appears that Pressure Plate TPC5 (located 30 ft (9.14 m) from the wall face) is no longer yielding reasonable results.

Another point to bring out is the decrease in pressure upon removal of the surcharge. As seen in the figures, a pressure decrease was present for each of the functional pressure plates from the second surcharge reading (36 ft fill height (11.0 m) above pressure plates) to the final grade readings taken after construction.

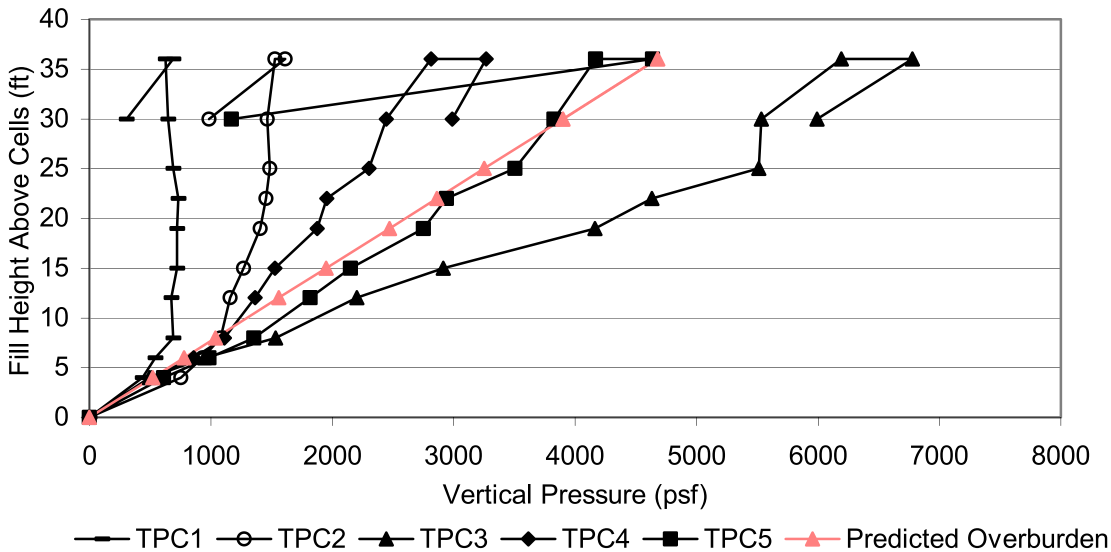


Figure 6.5. Measured vertical wall pressures for different heights of fill above the total pressure cells beginning at 6 ft within the wall backfill (UDOT vibrating wire reader results).

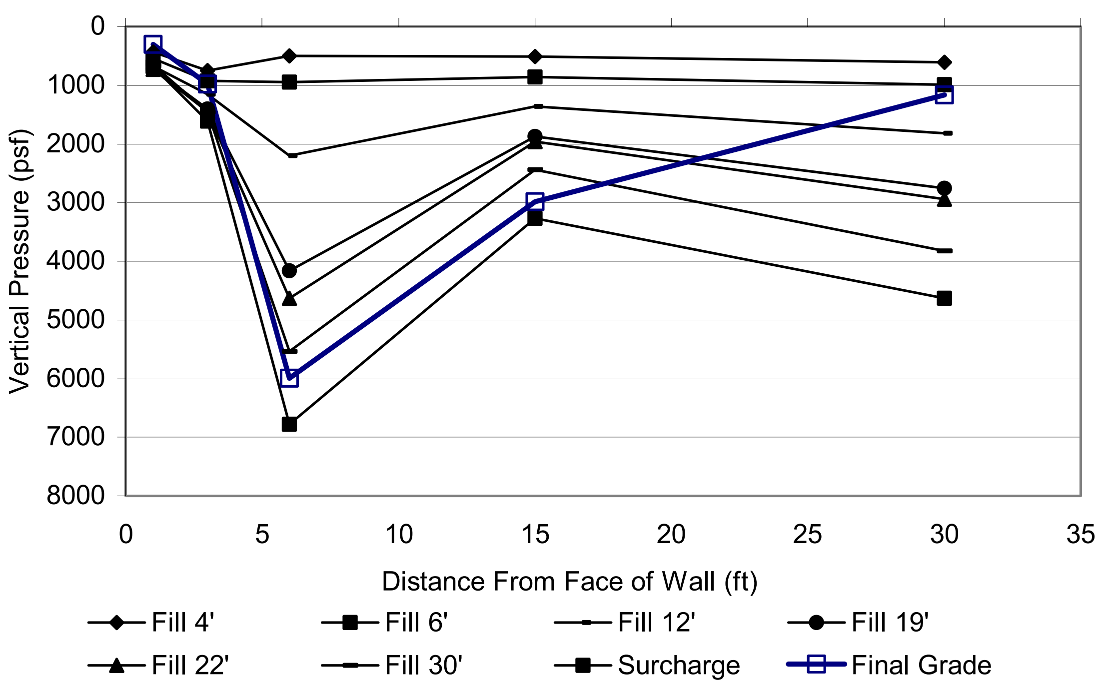


Figure 6.6. Measured vertical wall pressures versus pressure plate position within the wall (UDOT vibrating wire reader results).

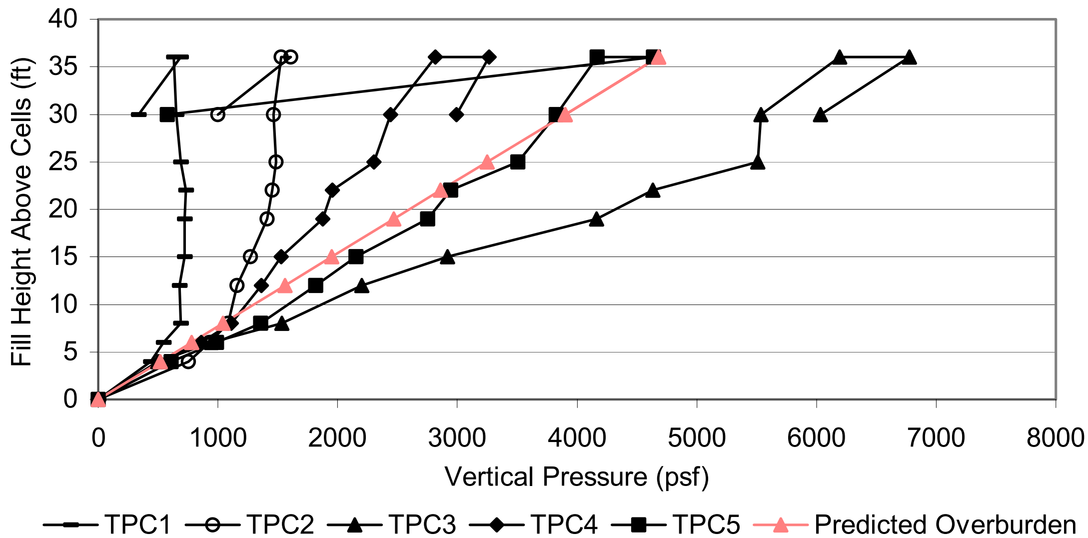


Figure 6.7. Measured vertical wall pressures for different heights of fill above the total pressure cells beginning at 6 ft within the wall backfill (USU vibrating wire reader results).

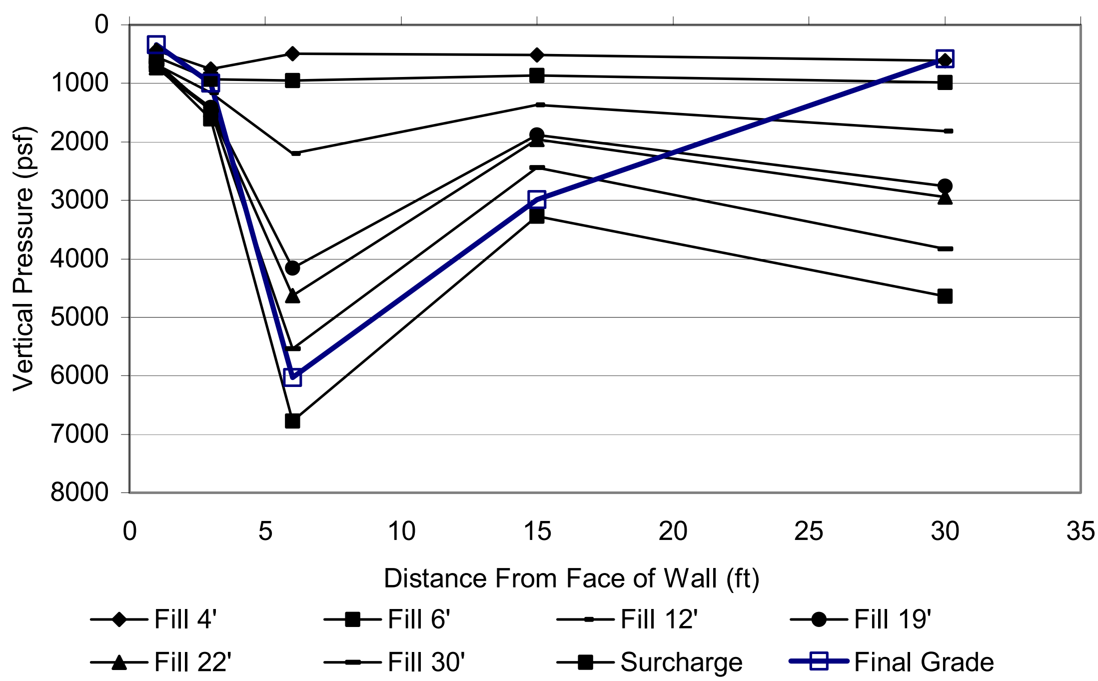


Figure 6.8. Measured vertical wall pressures versus pressure plate position within the wall (USU vibrating wire reader results).

Table 6.1. Tabular comparison of pressure plate results using the UDOT vibrating wire reader and the USU vibrating wire reader.

Date	02-Nov-02		02-Nov-02	
	Final Grade - UDOT*		Final Grade - USU*	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	2.115	10.578	2.341	10.578
23 - 3 ft from wall face	6.846	13.025	6.948	13.025
24 - 6 ft from wall face	41.621	16.791	41.904	16.791
25 - 15 ft from wall face	20.738	18.154	20.764	18.154
26 - 30 ft from wall face	8.119	252.000	4.014	18.154

The entire data set for the pressure plates during construction and post-construction is contained in Appendix H.

6.3 Vertical and Horizontal Deformations

6.3.1 Vertical Inclinometers

Additional measurements have been taken at each of the three vertical inclinometer casings and both of the horizontal casings since completion of the construction process. However, as with the strain gage and pressure plate readings, some additional work was required to allow readings to be taken.

There were several obstacles to overcome in taking readings from Inclinometer casing I1, which was the inclinometer within the wall footprint extending to the top of the wall. First, UDOT required fall protection in order for anyone to gain access to the upper casing. This is due to the fact that only a 6 ft (1.83 m) shoulder exists between the Jersey barrier and the edge of the wall. A number of alternatives were considered, including tying off to a vehicle on the traffic side of the Jersey barrier, installing tie-off loops on the Jersey barrier itself, creating some type of cable system to tie-off fall protection to, and several other ideas. A non-permanent system was desired that would have minimal effect on traffic yet have the safety of the persons taking the measurements as highest priority. Eventually, a steel bracket was designed that could be set on top of the barrier like a saddle, and fall protection harnesses could be attached to this bracket, allowing a person to be constantly protected from a possible fall. This prevented the need for a bumper vehicle on the traffic side of the barrier (which would have been required to protect whatever vehicle would have been used to tie-off to), and met the criterion of not being a permanent fixture. A photograph of the fall protection system that was devised is given in Figure 6.9.

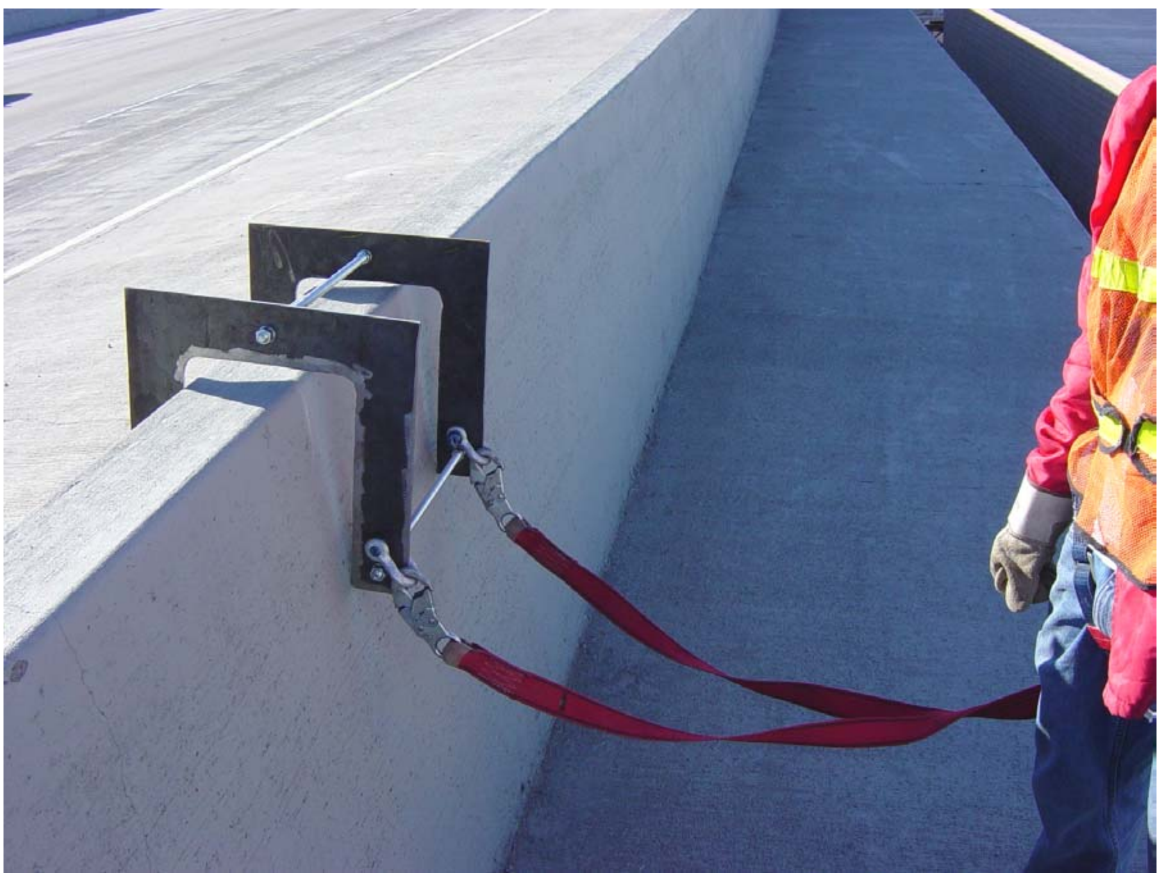


Figure 6.9. Photograph of the fall protection system devised for access to the upper inclinometer casing.

Another problem associated with Inclinometer I1 was the fact that the Jersey barrier was positioned such that the access hole cap was partially covered by the barrier. The concrete was chiseled at the base of the barrier just enough to allow the cap to be removed, thus allowing the inclinometer to be dropped into the hole and readings be made. Photographs showing the chisel work on the Jersey barrier are shown in Figure 6.10.

Problems were also encountered with Inclinometer I2. Once the secondary concrete fascia panels were constructed, additional fill was placed along the edge of the right of way and a drainage ditch constructed. To facilitate this drainage ditch, inclinometer casing I2 was cut off and subsequently buried under several feet of fill. Luckily, the caps used to cover the casings were replaced, such that minimal fill material fell into the casing. However, substantial time using a pick-axe and a shovel were devoted to digging up the casing. Photos showing the recovered casing are given in Figure 6.11 and Figure 6.12. Once the casing was discovered, readings were again taken.

The casing for Inclinometer I3, positioned outside the right of way for I-15 and outside of the wick drain zone, was not affected by construction. Readings were easily obtained.

Figure 6.10. Photographs showing the chisel work required for inclinometer casing I1.

Figure 6.11. Photographs showing the recovered inclinometer I2 casing (on the left in upper photo).

Figure 6.12. Additional photographs showing the recovered inclinometer I2 casing.

Figures 6.13, 6.14, and 6.15 show the updated horizontal deformations of the wall and foundation soils with the results from Inclinometer I1. Figure 6.13 shows all previous data with the most current reading included. Figure 6.14 shows only the most current reading and the previous reading in order to show post-construction movement. Figure 6.15 shows the same data as Figure 6.13 but focuses on the section for which new data was obtained, as will be explained.

Problems were encountered in analyzing the data, due to the fact that the inclinometer would not pass through the casing beyond a point 26 ft (7.92 m) below the top of the casing. Since movement was calculated with respect to an assumed stationary point at the deepest point possible, and a cumulative deflection with respect to that point calculated, another point of reference was required. It was decided that the most accurate alternative was to assume this point of reference to be at Elevation 322.6 ft (98.33 m), which was 2 ft (0.61 m) below the deepest reading taken from Inclinometer I1. It was assumed that the increase in horizontal deflection from the previous reading at this elevation for I1 would be the same as the increase in horizontal deflection from the previous reading at the same elevation for Inclinometer I2. This was considered to be slightly conservative, since Inclinometer I1 had shown less movement than I2 at that elevation during the construction process.

Another factor that required some adjustment was the fact that the casing was cut off upon removal of the surcharge and prior to placement of the concrete pavement at final grade. The raw data were shifted such that the best agreement between peak readings was achieved, then the raw data were interpolated in order to calculate displacements with respect to the baseline. These displacements are given in the figures here and in Appendix I, which contains the tabulated inclinometer data as collected to date.

As noted, from the limited data obtained due to the obstruction in the casing, it appears that some movement (on the order of 0.5 inches (12.7 mm) at the uppermost elevation with valid readings) has taken place since the completion of the wall. Presumably this movement is only within the wall itself and not in the foundation soils beneath the wall, as will be seen in the results from Inclinometer I2. Continuing measurements over coming years will monitor the drift occurring within the wall and in the soils beneath the wall, to determine how much additional movement may occur.

The readings for Inclinometer I2 also required some manipulation, due to the fact that the casing had been cut off upon construction of the drainage ditch, as mentioned above. The raw data were plotted to compare the newest set of readings to the most recent previous readings, with the intent of matching peaks to determine how the data needed to be adjusted to match the baseline data. Fortunately, it appears that exactly 4 ft (1.22 m) of the casing was cut off, which allowed a simple shift of data to solve the problem with no interpolation necessary. The updated data for Inclinometer I2 are given in Figure 6.16 and Figure 6.17.

As seen in these figures, negligible movement has occurred in Inclinometer I2 from the end of construction to the time the most recent readings were taken (02 November 2002). Continued monitoring will occur, but one would not expect substantial post-construction movements to transpire.

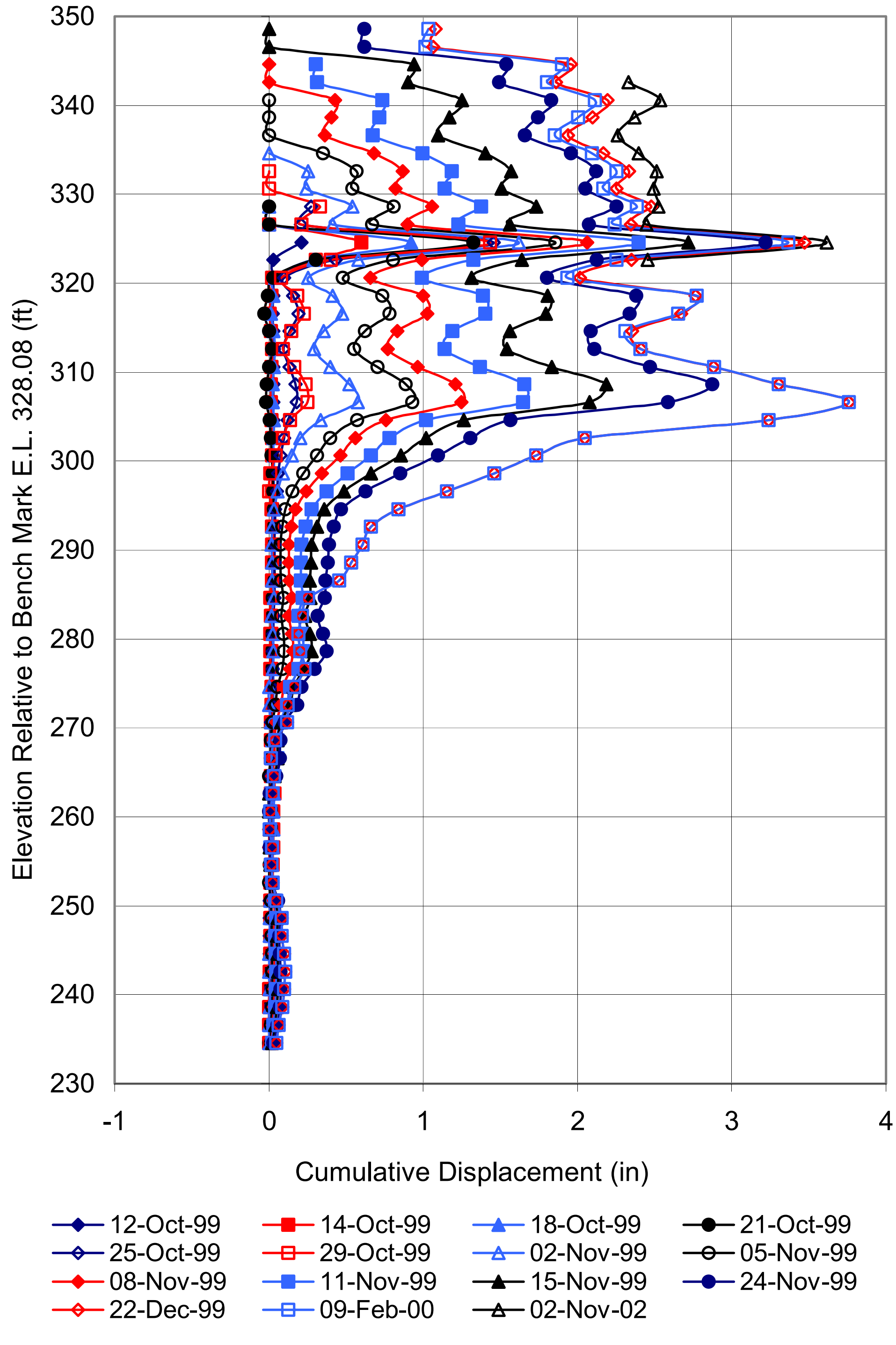


Figure 6.13. Updated horizontal deformations of wall as collected from inclinometer I1.

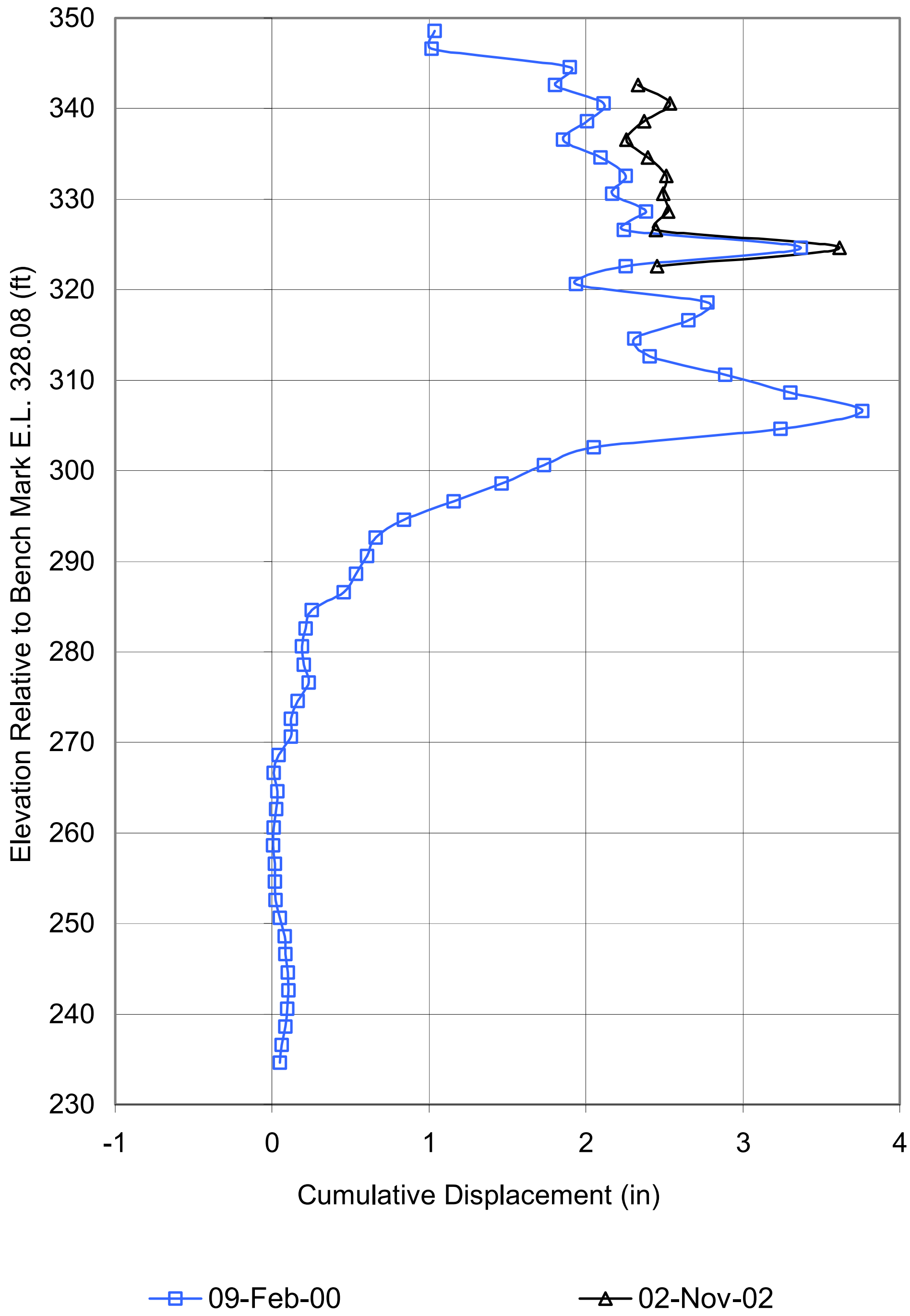


Figure 6.14. Updated horizontal deformations of wall as collected from inclinometer I1 (two most recent sets of data showing post-construction deformations).

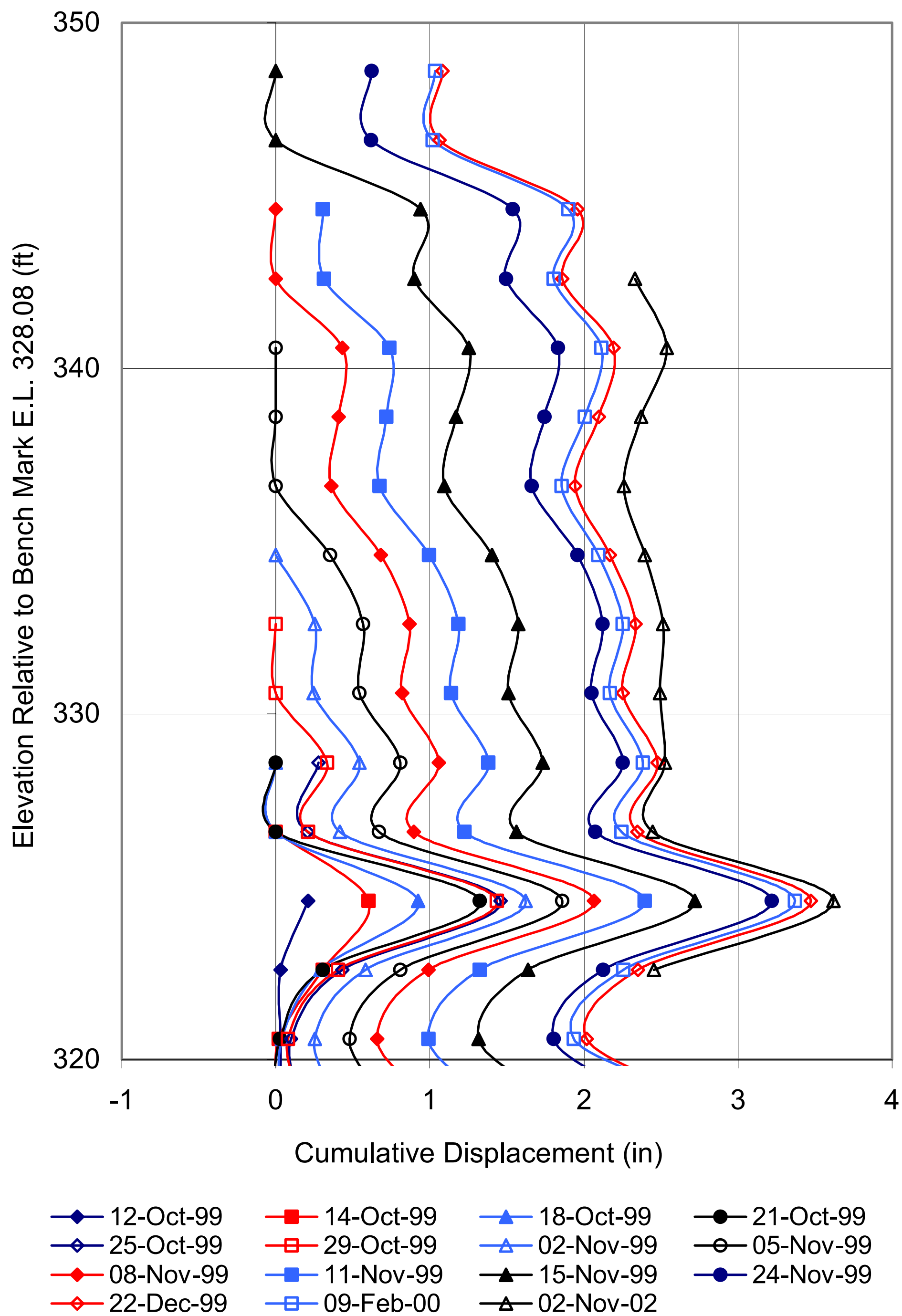


Figure 6.15. Updated horizontal deformations of wall as collected from Inclinometer I1 (zoomed to clarify most recent data collected).

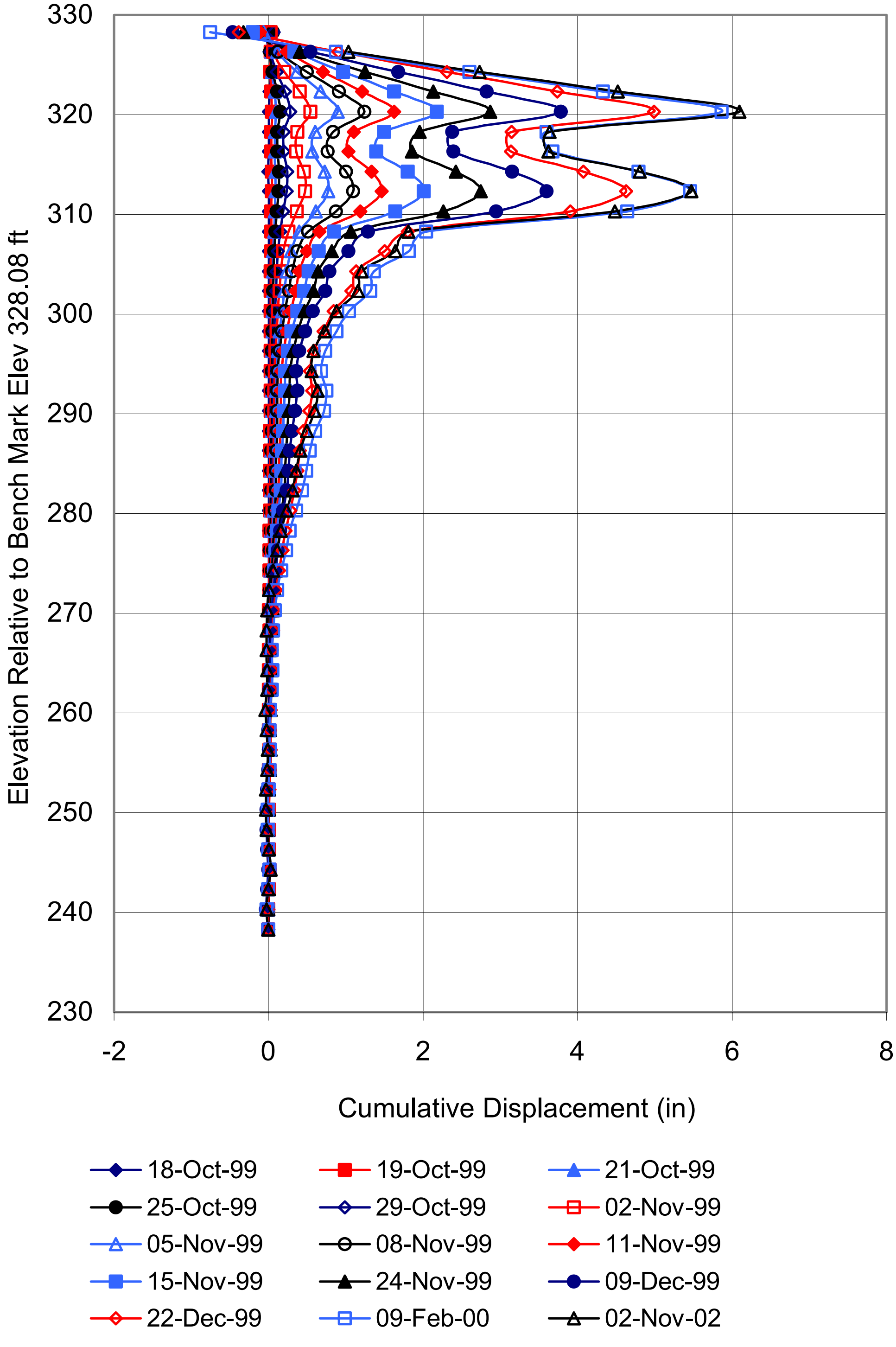


Figure 6.16. Updated horizontal deformations of wall as collected from inclinometer I2.

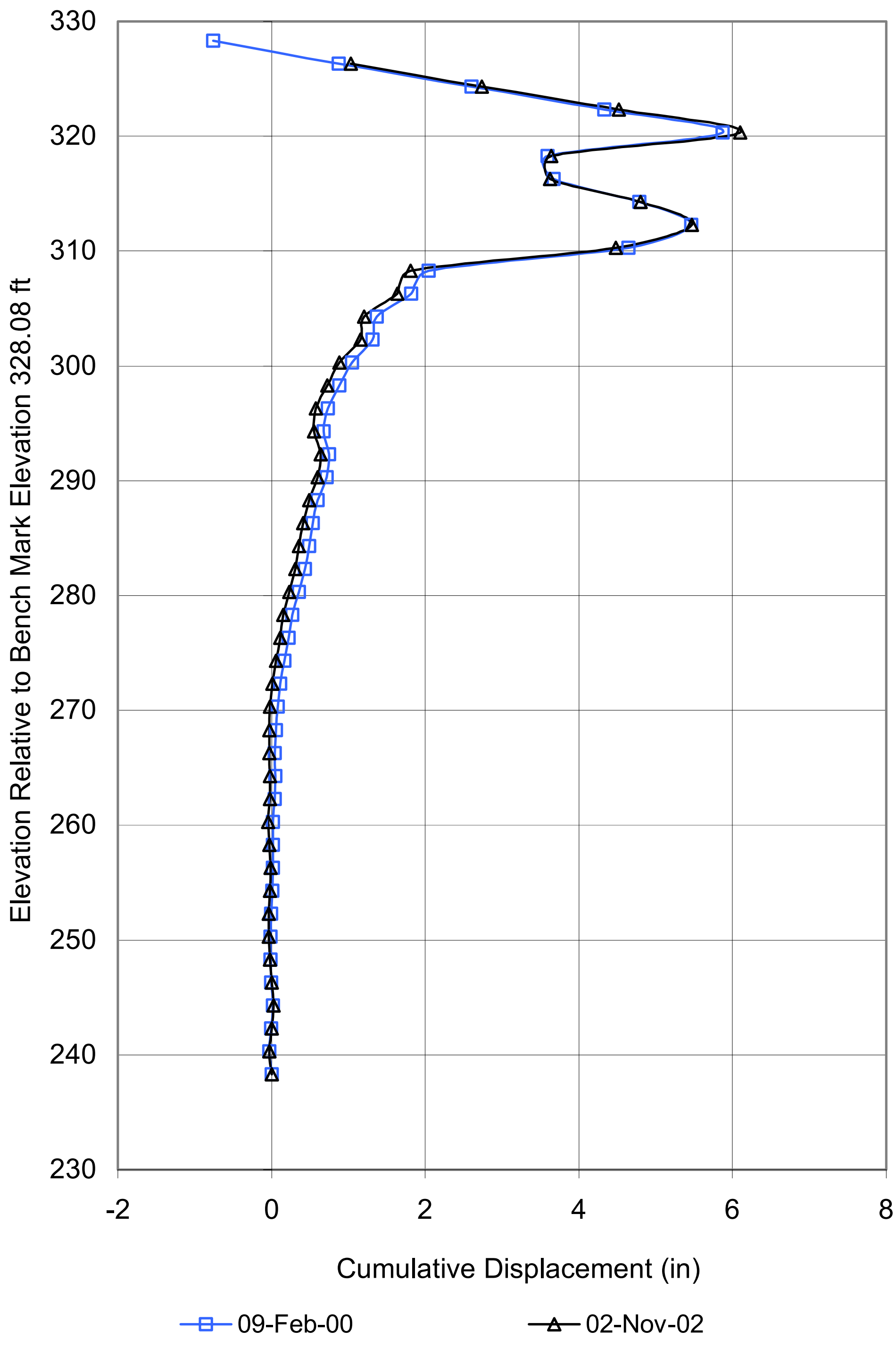


Figure 6.17. Updated horizontal deformations of wall as collected from Inclinometer I2 (two most recent sets of data showing post-construction deformations).

Inclinometer I3 required the least data manipulation before results could be obtained. However, one problem was noted upon inspection of the data. Readings throughout the course of the construction process were only taken in the top 30 ft (9.14 m) beneath the ground surface. Thus, there is only baseline data for this uppermost soil that dates to the beginning of construction. The most recent data obtained (02 November 2002) recorded data from the ground surface to the bottom of the inclinometer casing (90 ft or 27.4 m). From the results from Inclinometer I2, it appears that some movement likely occurred in I3 at the 30 ft (9.14 m) depth during construction of the wall, but due to the data only being collected for that uppermost 30 ft (9.14 m), the displacement at that depth was required to be zero. Future readings will be able to use the most recent readings as a baseline, which will assume that no displacement occurs at a 90 ft (27.4 m) depth, which is a more valid assumption. The results of Inclinometer I3 are given in Figure 6.18 and Figure 6.19.

To facilitate long-term monitoring of horizontal movement, plots of the horizontal drift (displacement with respect to the zero readings) versus the log of time have been constructed. These will allow primary and secondary movements to be monitored over extended periods of time. Comparison of movements at a given elevation for the three inclinometers can be made over time, as well as comparison of displacements at various depths for a given inclinometer over time. These plots, as mentioned, will be of great benefit in the prediction of long-term horizontal movement within the wall and in the foundation soils beneath the wall. An example of such a plot is given in Figure 6.20, and a number of additional plots are included in Appendix O.

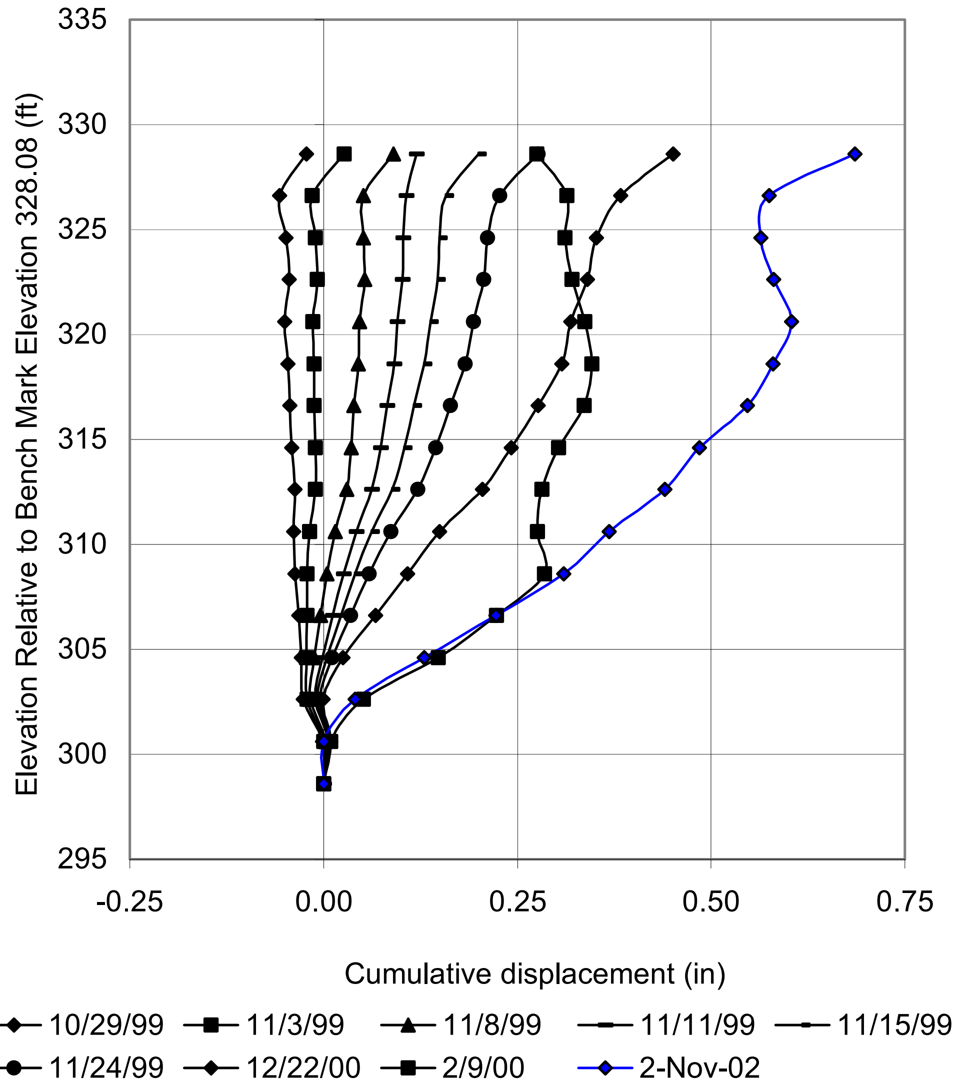


Figure 6.18. Updated horizontal deformations of wall as collected from inclinometer I3.

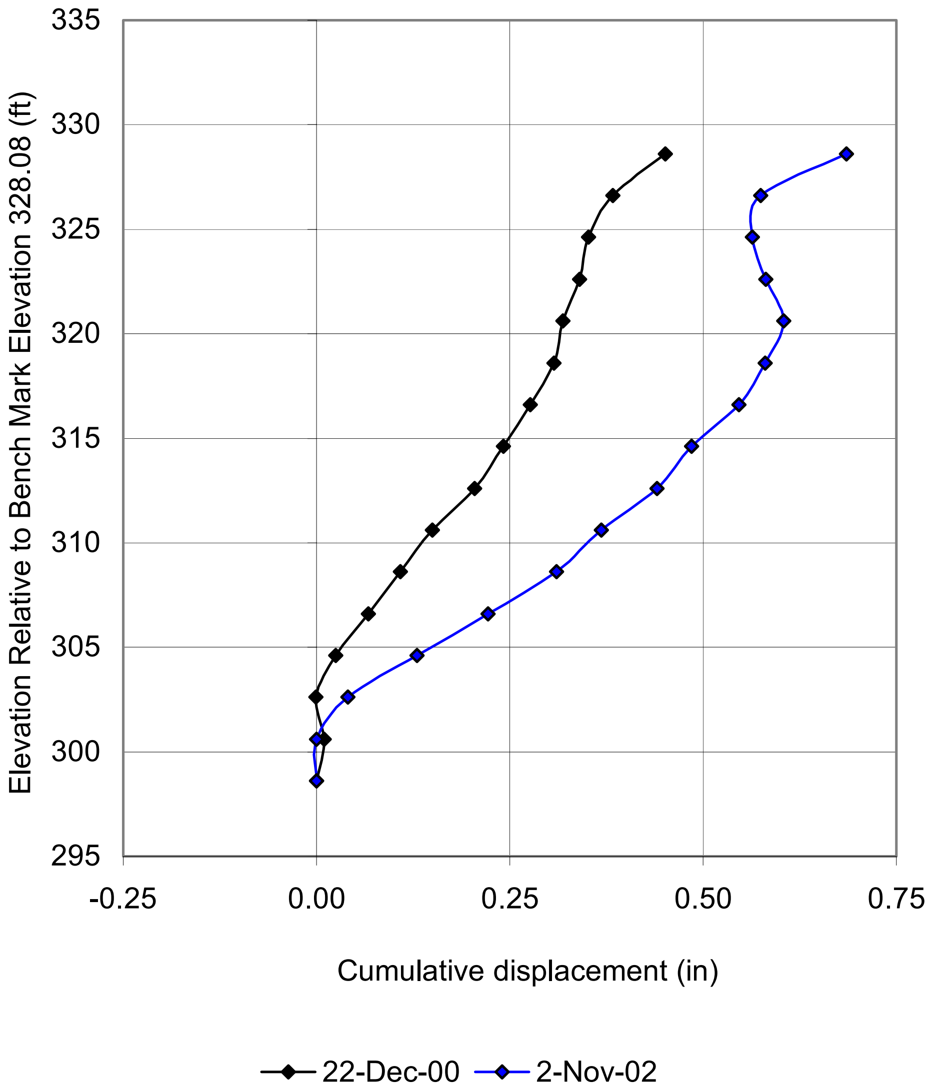


Figure 6.19. Updated horizontal deformations of wall as collected from inclinometer I3 (two most recent sets of data showing post-construction deformations).

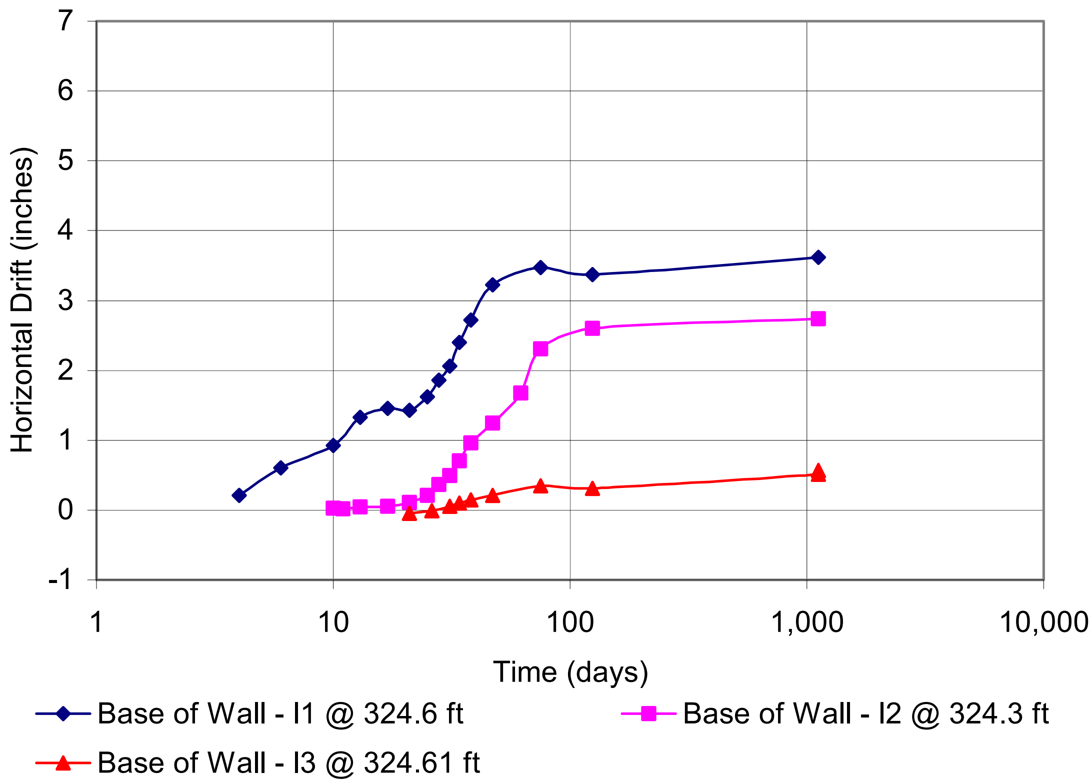


Figure 6.20. Example of long-term plot to monitor horizontal movement over time (additional plots found in Appendix O).

As seen in Figure 6.20, minimal displacement has occurred over the log cycle from the end of construction (124 days) to the most recent readings (1121 days). As an example, Inclinometer I1 has moved 0.25 inches (6.35 mm) at the given elevation (324.6 ft (98.94 m)) during this period of time. Assuming the movement follows a pattern similar to secondary soil consolidation, the increase in deflections over the next log cycle (ie. 1000 days to 10,000 days) will be the same as the increase shown over the previous log cycle. Thus, over the next approximately 27 years the increase in deflections will only be about the same (0.25 inches (6.35 mm)) as the minimal increase over the past 2.7 years, such that hardly noticeable displacements will be taking place in coming years. It will be of great interest to note whether or not the horizontal displacements follow these expected trends.

6.3.2 Horizontal Inclinometers

Some work was required in order to take readings on the two horizontal inclinometers as well. Horizontal Inclinometer H1 (located in the manhole, extending beneath the wall) was intact, such that all that was required to take the readings was to obtain a small fan to provide ventilation in the manhole for several minutes before entrance to ensure that any toxic fumes that may have entered the manhole were dispersed. Again, this was a safety concern, not an equipment concern. The cable used to pull the inclinometer into the casing was intact, and the readings were obtained fairly easily.

The upper Horizontal Inclinometer (H2), however, required more work before readings could be obtained. As with the strain gage and pressure plate cables, a hole had to be cored in the concrete fascia panels in order to have access to the inclinometer casing. The cored hole for this inclinometer was shown in Figure 6.1.

During the time between the coring of the hole through the fascia panels and the initial attempts to take additional readings, the cable strung through the casing that was used to pull the inclinometer into the hole was stolen. Numerous attempts were made using a variety of tools to make an effort to re-string the cable, such as attempting to push a steel fishtape into the casing, around the pulley, and back out. However, these attempts were fruitless.

After discussing the matter with a representative of SINCO, Inc., it was decided to create an extensible rod that could be used to push the inclinometer into the casing instead of attempting to re-thread a cable to pull the inclinometer into the casing. As a result, ten 5 ft (1.52 m) pieces of 0.75 inch (19.0 mm) PVC pipe were purchased with connection sleeves glued to one end of each. A rope was threaded through the pipes and sleeves, such that the pipes would not become disconnected in the hole and become irretrievable. As the inclinometer was pushed into the hole in 5 ft (1.52 m) lengths, additional sections of pipe were added that allowed the inclinometer to be pushed the entire distance into the hole. This allowed the problem with the missing cable to be overcome. A photograph of these interconnectable PVC pipes is given in Figure 6.21.

Figure 6.21. Photograph showing the interconnectable PVC pipes used to push the horizontal inclinometer into the H2 casing.

One final obstacle to overcome was also present. Near the back of the casing, an obstruction was encountered. The obstruction did allow the inclinometer past with some effort. However, upon removal of the inclinometer some rotten remains and an awful stench were attached to the inclinometer and a portion of the cable. It appears that some sort of animal (a rat, perhaps) climbed into the inclinometer casing, proceeded a long distance into the casing, and was unable to turn around to escape and died. The cap that had been in place to cover the casing was apparently removed and/or stolen when the cable was stolen, allowing access to the casing hole. Before the next set of readings are taken, attempts will be made to flush out the animal remains to make taking measurements a much less offensive matter, and a cap will be replaced over the end of the casing to prevent such an occurrence from happening again.

Settlement calculations using the data collected from the horizontal inclinometers were much more straightforward than the calculations for the vertical inclinometers, since neither casing had been altered in any way from the previous readings. Since the manhole had not settled at all during the construction process, it was assumed that it has not settled at all in the months following construction. The manhole position will be monitored over time to make sure no settlement does occur, but negligible change is anticipated.

Updated results from Inclinometer H1 are given in Figure 6.22. As noted in observing this figure, some additional movement has taken place in the years following construction. Continued observation over several years will show such continued secondary consolidation taking place, as will be further shown later.

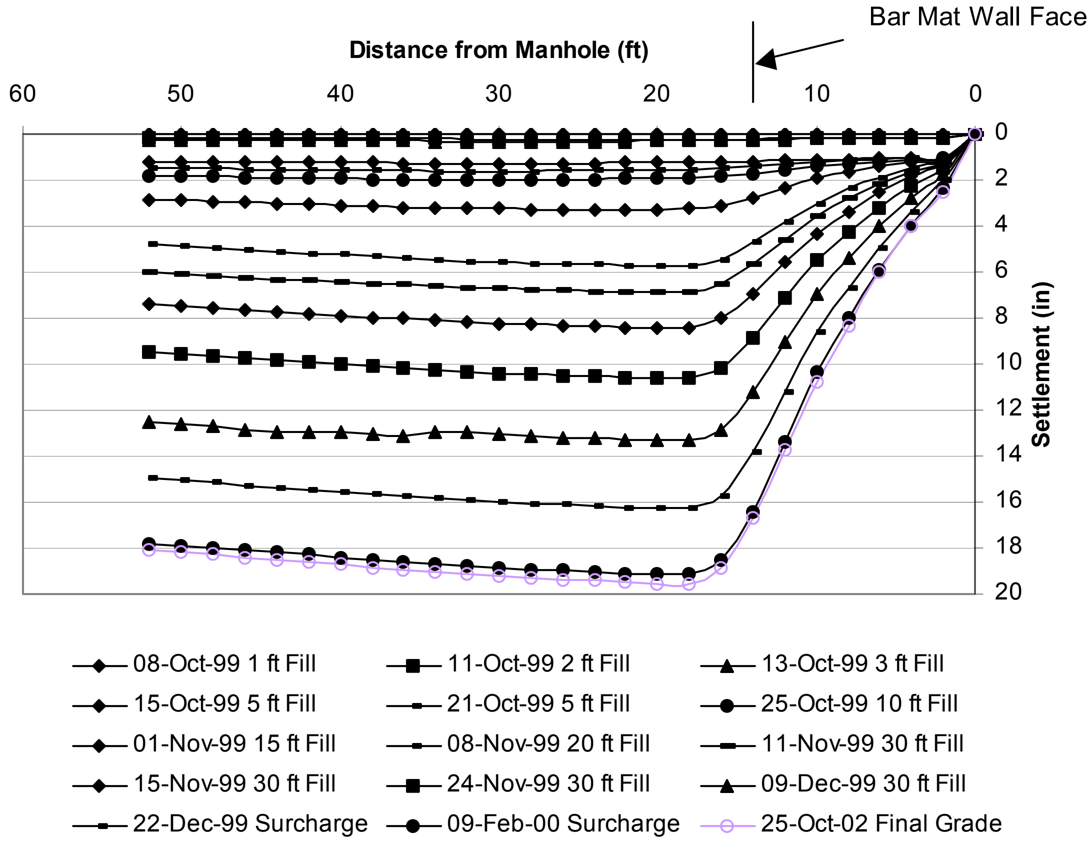


Figure 6.22. Updated movement of horizontal inclinometer H1 originating from a manhole and going beneath the wall face at about 14 ft.

One problem was present in processing the results of Horizontal Inclinometer H2. The presence of the concrete fascia panel made it more difficult to survey the elevation of the casing. It was certain that the wall had settled during the time since the previous readings, but since accurate surveying through the cored hole was very difficult, the extent of settlement was not directly available. It was decided to assume that the face of the wall had settled the same amount that the reading taken a distance of 18 ft (5.49 m) from the manhole (4 ft (1.22 m) into the wall footprint) had settled in the results from

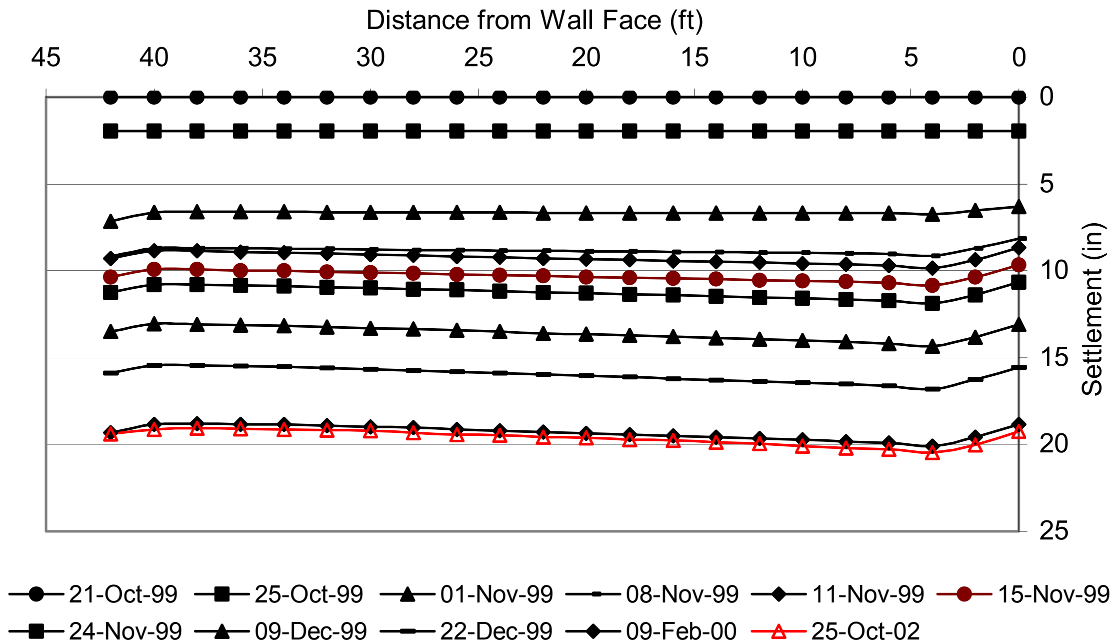


Figure 6.23. Updated horizontal inclinometer H2 beginning at an initial height of 8 ft in the wall fill and originating at the wall face.

Inclinometer H1. With this adjustment made, the updated results from Inclinometer H2 are given in Figure 6.23.

As seen in this figure, some movement is still occurring, and this movement will continue to be monitored over time. As noted in the discussion of the vertical inclinometer results, much of the movement is expected to follow the behavior of secondary consolidation. It is thus appropriate to monitor settlement results with respect to the log of time. Such figures are included here, as given in Figures 6.24 through 6.26. These figures show the settlement at the toe of the wall (18 ft (5.49 m) readings for H1 and 4 ft (1.22 m) readings for H2) as well as the back of the wall (52 ft (15.8 m) readings for H1 and 38 ft readings (11.6 m) for H2). The data presented in Figure 6.24 is repeated in Figure 6.25 and Figure 6.26 for clarity in observing the results of the H1 readings at the toe and back and the H2 readings at the toe and back, respectively.

As seen in these figures, and as noted in the discussion of the vertical inclinometers, minimal movement has occurred over the past log cycle of time. Assuming secondary consolidation theory applies, again one would expect the same amount of movement to occur over the next log cycle (1000 to 10,000 days) as has occurred during the past log cycle (100 to 1000 days). Again, from this data one would expect minimal additional movement over the next 27 years. It will be of great interest to monitor this movement over time and see if this is indeed the case.

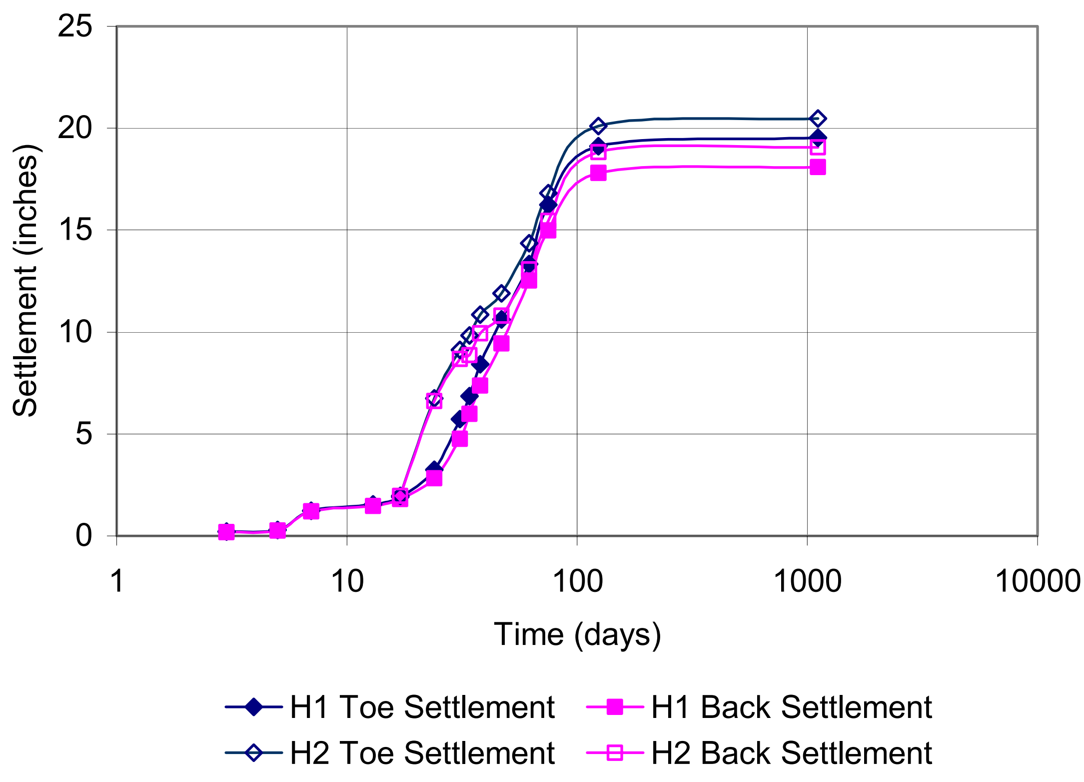


Figure 6.24. Wall settlement at toe and back of wall as measured by horizontal inclinometers H1 and H2.

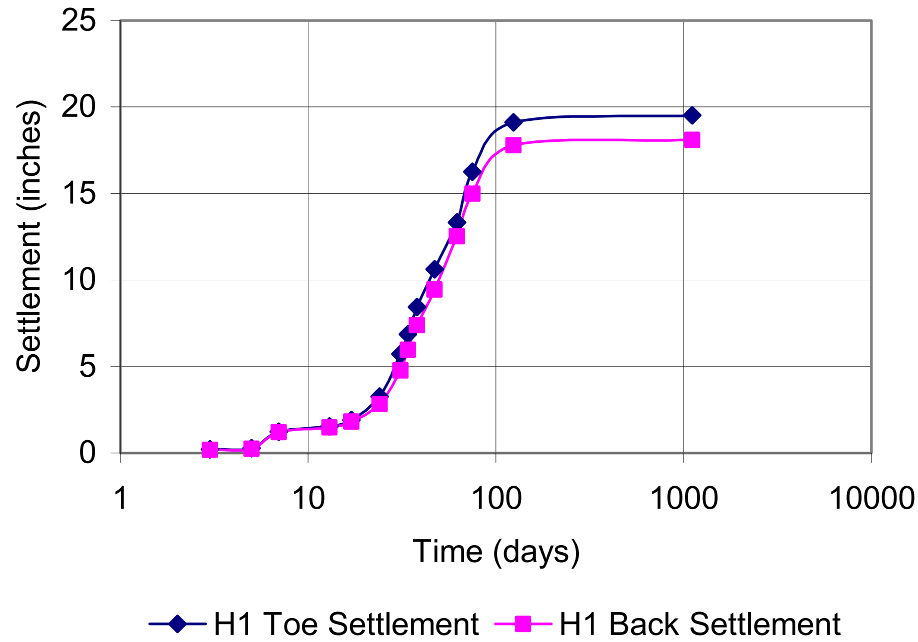


Figure 6.25. Wall settlement at toe and back of wall as measured by horizontal inclinometer H1.

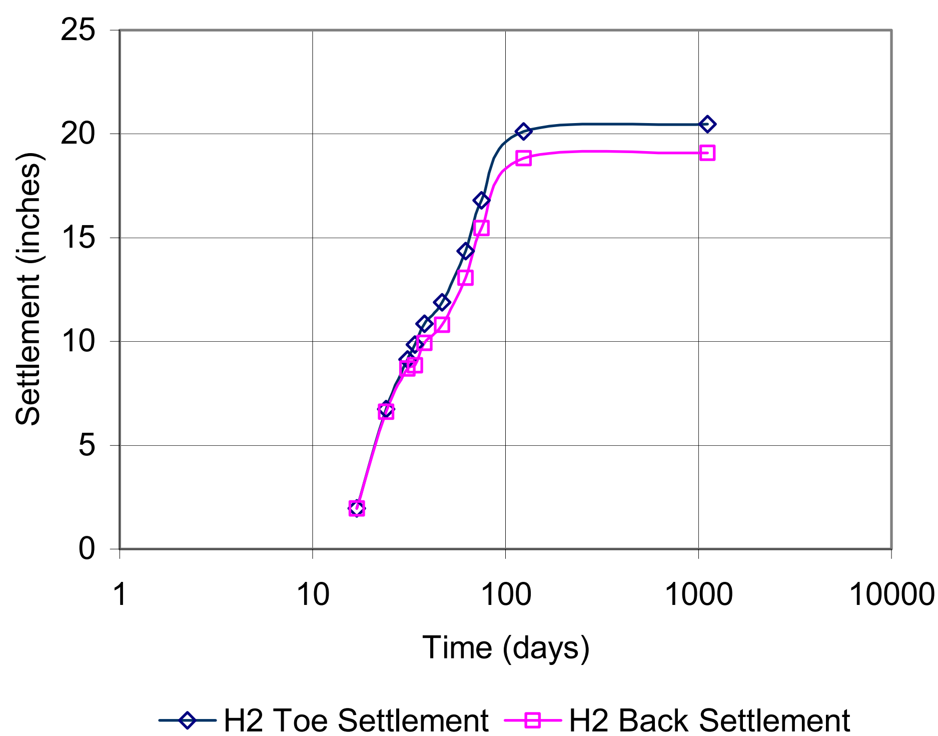


Figure 6.26. Wall settlement at toe and back of wall as measured by horizontal inclinometer H2.

One additional tool in monitoring movement over coming years will be to measure the rotation of the wall according to the horizontal inclinometers. The angle of rotation for each of the inclinometers was calculated using the points given for the toe and the back of the wall given above (Figure 6.24). The difference in elevation from the toe to the back was easily determined, and the horizontal distance between the two points was known. Simple trigonometry allowed the angle of rotation to be calculated. The results of these calculations are again plotted with respect to the log of time as given in Figure 6.27.

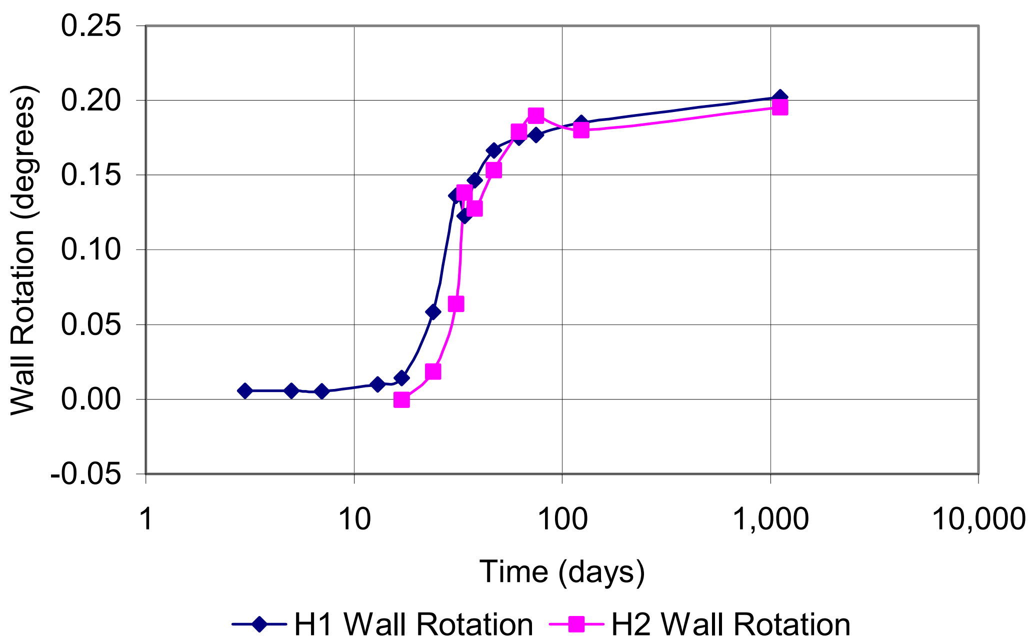


Figure 6.27. Wall angle of rotation as determined from measurements by horizontal inclinometers H1 and H2.

As seen in the figure, rotation of the wall is minimal, being less than a quarter of a degree. As also seen, the increase in rotation again appears to follow secondary consolidation theory, such that increased rotation over the next log cycle would be expected to approximate the increase in rotation over the past log cycle. Again, monitoring this rotation over a number of years will be of great interest.

6.3.3 Horizontal Extensometers

Obviously, once the concrete fascia panels were in place, the horizontal extensometers were no longer accessible. Even if attempts to core holes at each extensometer position had been made, there would have been no way to replace the stringline or make the appropriate measurements, making any additional measurements impossible. Thus, no additional data will be obtained from the horizontal extensometers.

6.3.4 Sondex Settlements

The same problems were present with respect to the Sondex casings as were present for each of the vertical inclinometer casings, as mentioned in Section 6.3.1. Again, fall protection was required to access the Sondex casing on the top of the wall (S1), and chiseling of the Jersey barrier was required in order to remove the cover plate over the casing and allow measurements to be taken. Sondex casing S2 was found after substantial digging, again having been cut off and buried when the drainage ditch was constructed. Photographs of recovered Sondex casing S2 are shown in Figure 6.28. Sondex casing S3 was undisturbed, and measurements were obtained without additional work.

Figure 6.28. Photographs of recovered Sondex casing S2 (at right in upper photograph).

The same spreadsheets used to compute strains and settlements for measurements taken during construction were again used for calculations for the most recent data collected. Adjustments were again necessary for the two casings (Sondex casings S1 and S2) that had been cut off since the previous measurements were made. These adjustments were made in a manner similar to the adjustments required for Vertical Inclinometer casings I1 and I2. The updated results for each Sondex tube are given in Figure 6.29 through Figure 6.34.

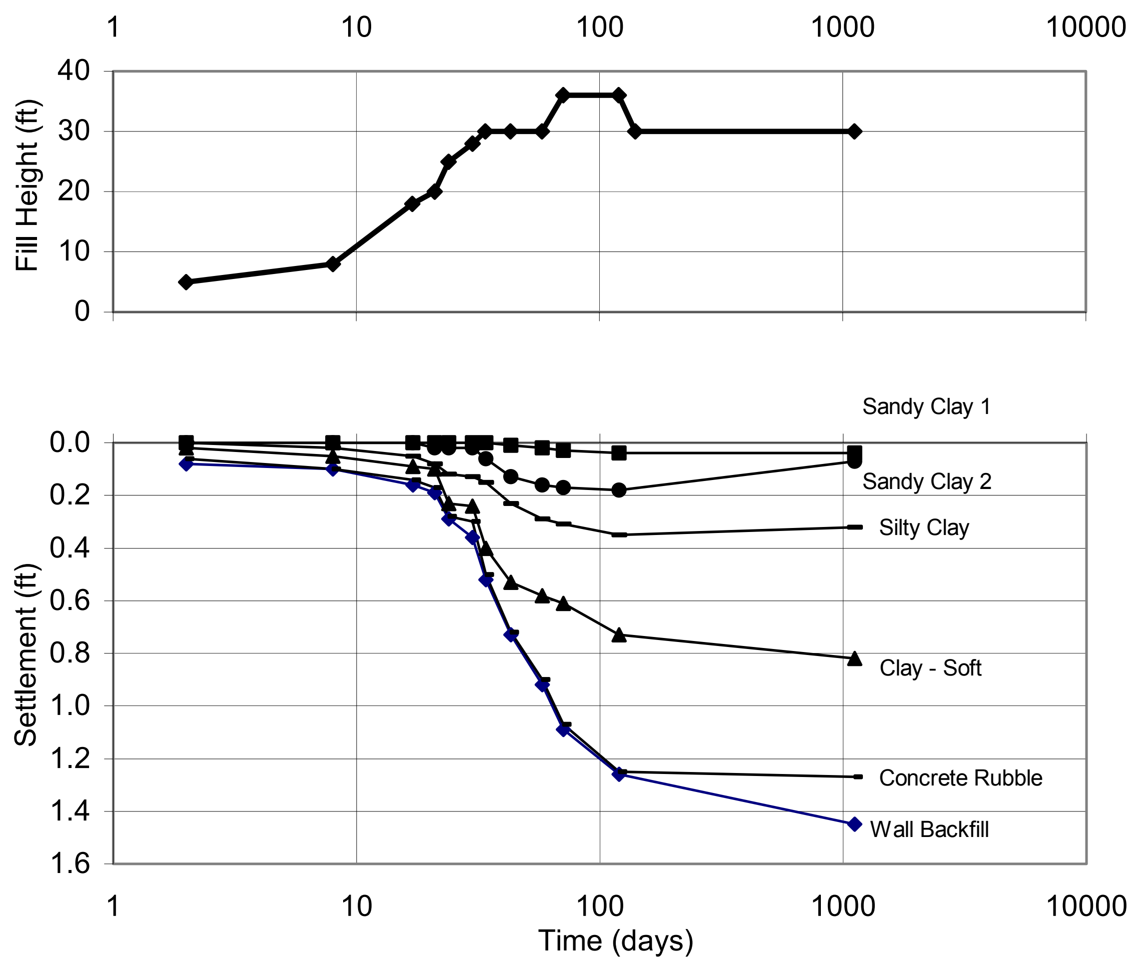


Figure 6.29. Updated results from Sondex tube S1 settlement measurements.

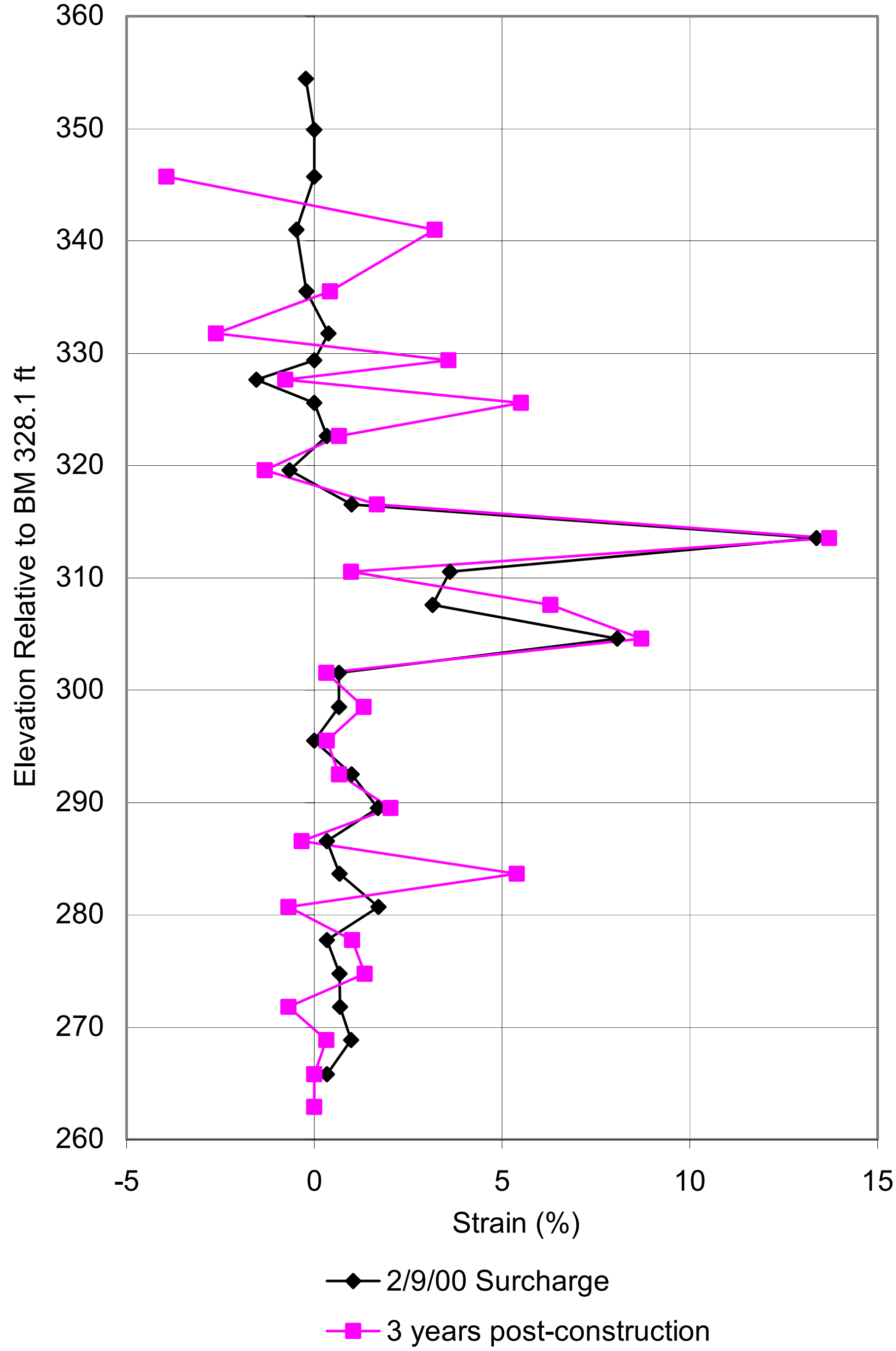


Figure 6.30. Updated results from Sondex tube S1 strain measurements.

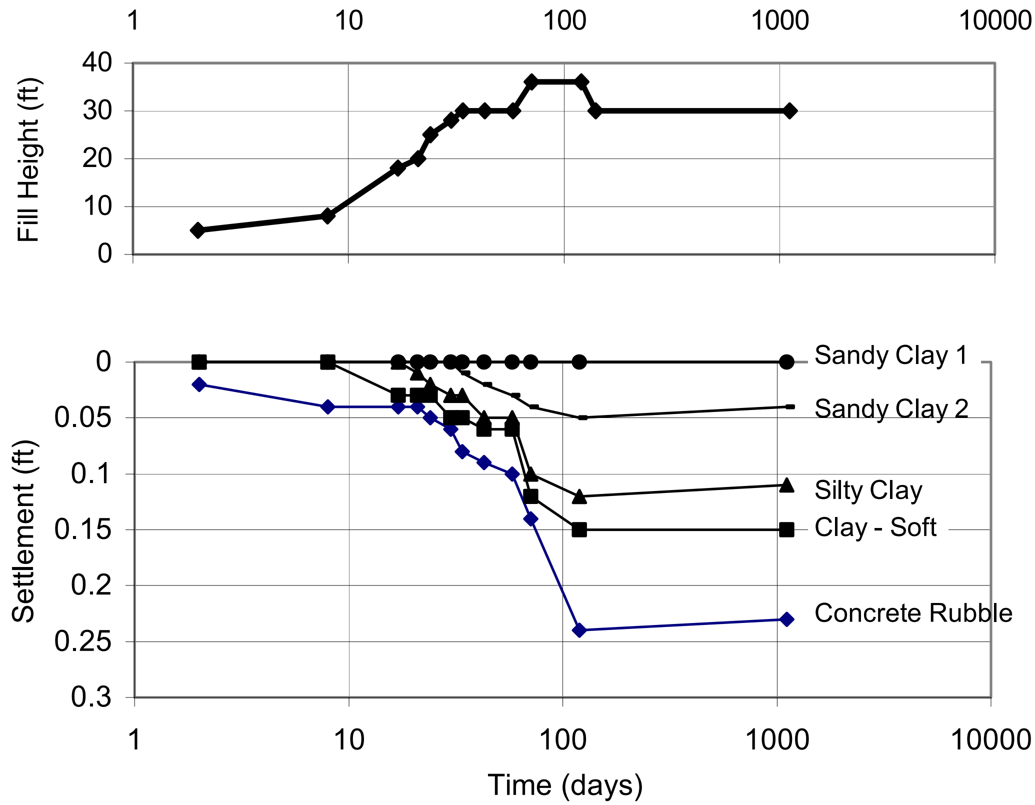


Figure 6.31. Updated results from Sondex tube S2 settlement measurements.

As noted in the figures given, minimal change has occurred with respect to the Sondex measurements since the end of wall construction. In some cases, slight rebound appears to have occurred according to the data. However, this apparent rebound may simply be due to slight inconsistencies in the taking of the measurements. The technique involved in reading the Sondex positions is not precise beyond perhaps 0.03 ft (9.1 mm), such that minor discrepancies may appear to create such unexpected behavior as the rebound mentioned or the negative strains that have been presented throughout construction.

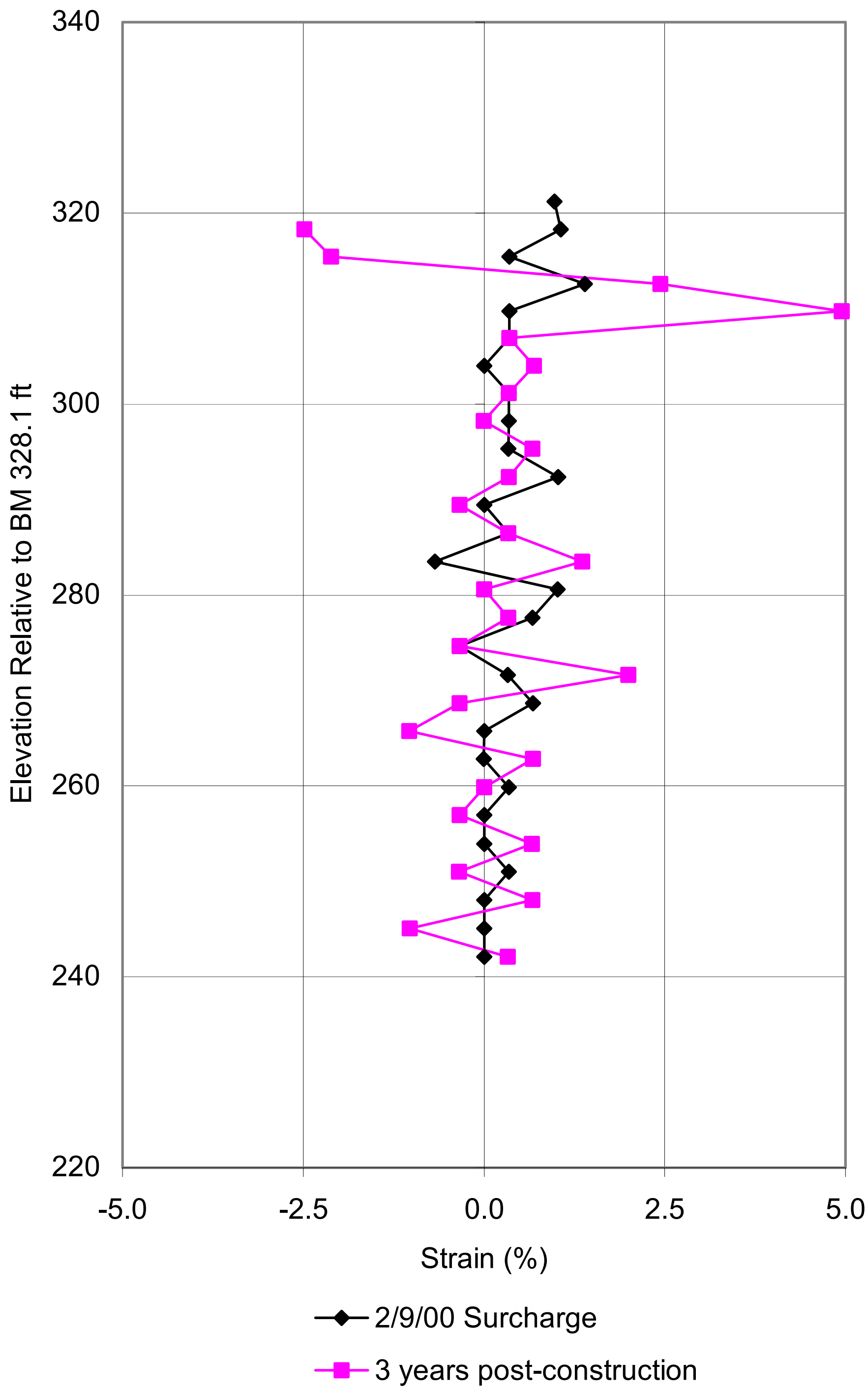


Figure 6.32. Updated results from Sondex tube S2 strain measurements.

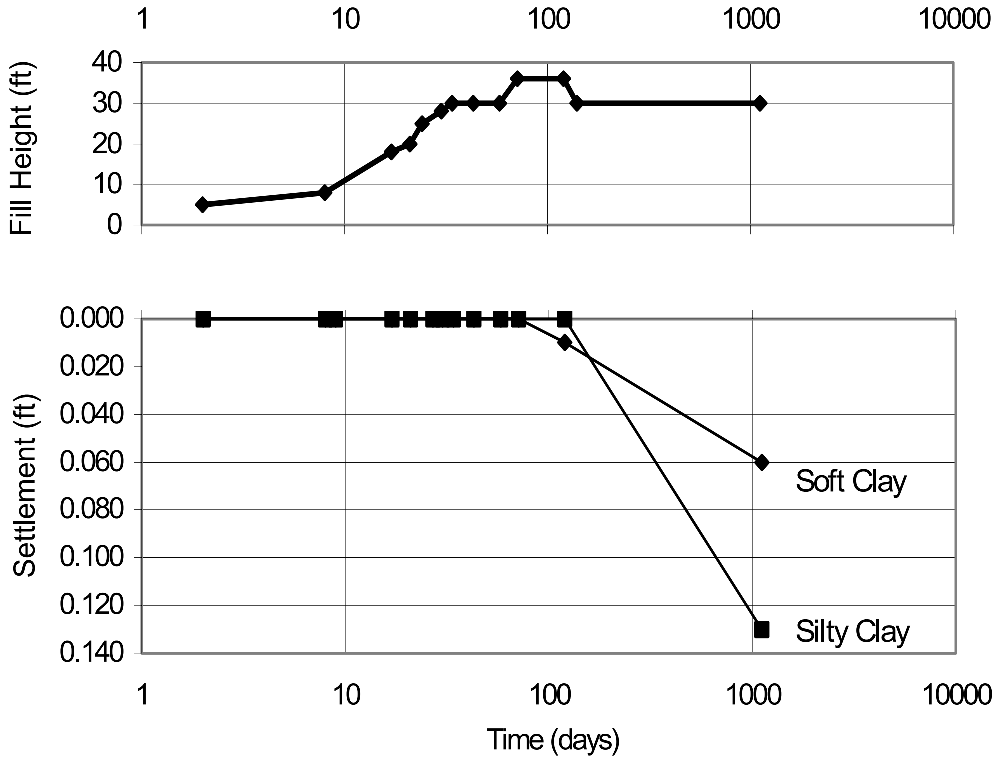


Figure 6.33. Updated results from Sondex tube S3 settlement measurements.

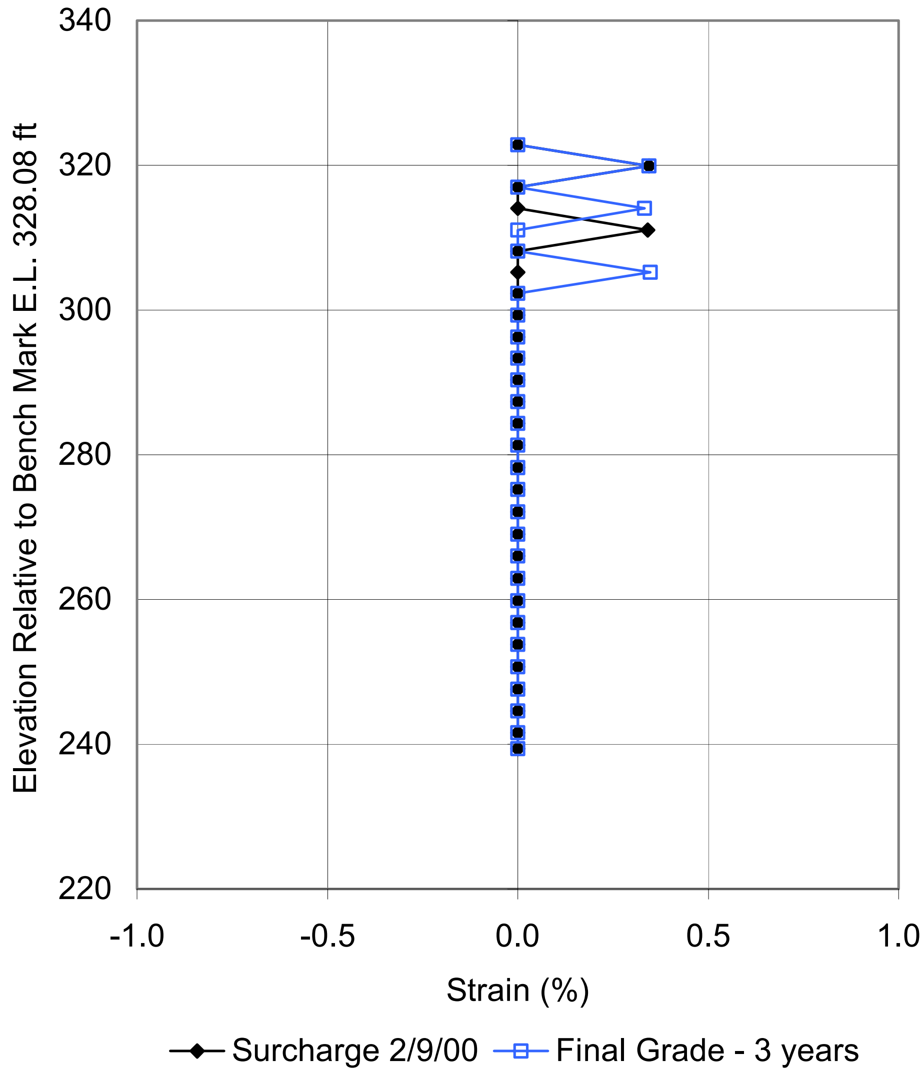


Figure 6.34. Updated results from Sondex tube S3 strain measurements.

6.3.5 Settlement of Survey Monuments

No additional data have been collected with respect to the survey monuments. However, additional readings will be taken as time progresses to monitor any minimal changes in position of these markers.

6.3.6 Deformation of Wall Face

As with the Horizontal Extensometers, once the secondary stage concrete fascia panels were in place, measurements of the deformation of the wall face were no longer possible. Thus, no additional data will be available with respect to the deformation of the wall face.

6.3.7 Overall Deformation

Due to the minimal change in deformations since the end of construction, an updated plot of deformations as contained in Figure 5.44 in Chapter 5 was considered to be redundant. However, as time progresses, updated plots showing net deformations may be constructed.

CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 Summary

To study and further understand the actual behavior of the MSE walls on soft clays, an extensive instrumentation program was implemented on a 30 ft (9.14 m) high segment of Wall R-346-1C located near 3600 South and I-15. The instrumentation program used on this wall was conducted to measure forces, vertical pressures, and horizontal and vertical movement.

Two different sections of the wall were monitored with strain gages. One section consisted of both primary and intermediate bar mats. The other section consisted of only the primary mats without the intermediate bar mat. The fascia bar mats were also instrumented with stain gages. About 500 strain gages were used for the bar mats and fascia panels monitored in this study.

Other instrumentation used in the wall included vertical and horizontal inclinometers to measure deformations in the wall backfill and subsurface material, horizontal extensometers to measure horizontal movement of the wall, total pressure cells to monitor overburden stresses, and Sondex settlement systems to measure settlement in the subsurface soils. All were designed to measure the movement of the wall during and after construction.

The results obtained from this instrumentation program were then presented in this report. An envelope of the lateral earth pressure coefficient, K, was back-calculated from the field values and was compared to the recommended envelopes for design of wire mesh systems. The other field instrumentation has also been presented and analyzed and compared to possible theoretical failure scenarios (Christopher et al., 1989).

7.2 Conclusions

This report presents the instrumentation installation plans and the measurements obtained for a mechanically stabilized earth (MSE) wall located along the I-15 reconstruction project in Salt Lake City, Utah. This is one of several reports to be submitted as a portion of this project. This report contains both the initial instrumentation plan and the monitoring of wall behavior during the construction process and also the initial post-construction monitoring report of behavior of the wall in the initial three years following construction. Future reports to be submitted will include the results of laboratory testing related to the foundation materials, the effects of sample disturbance on soil samples, the results of a computer model of the wall with comparisons to the measured behavior, and a long-term monitoring report to show the long-term behavior of the wall using continued measurements over time.

Important findings have been observed during and following the construction of this MSE wall. These include conclusions relating to the internal stability of the wall and also the internal and external wall displacements. These conclusions are based on data collected from extensive instrumentation located within the wall and in the foundation material beneath the wall. This instrumentation includes over 500 strain gages in the reinforcement bar mats and fascia panels, three vertical and two horizontal inclinometers, three Sondex settlement systems, five pressure cells, and 60 horizontal extensometers.

7.2.1 Conclusions Regarding Internal Stability

A number of conclusions are made concerning the internal stability of the wall.

- The maximum tension in the bar mats was much less than the allowable tension to which the bar mats could be subjected. The minimum ratio of the allowable yield stress to the tensile stress existing in the longitudinal bars of the reinforcement is 2.5 for one strain gage position, with only four gage positions having ratios less than 5.0 (out of more than 90 functional positions). Thus, the vast majority of the bar mats are subjected to tensile forces less than 20 percent of the yield strength of the material. The allowable stresses used in calculating these ratios considered the entire cross section of the longitudinal bar, not taking into account corrosion of the steel over time, which decreases the cross sectional area.

- From the measured lateral earth pressure coefficient K (as back calculated from tension measurements in the bar mats) it appears that the design value of K as currently required by AASHTO (1998) is conservative. A number of the back calculated values appear to exceed the current AASHTO design envelope, but closer inspection shows that these values occur in the mats near the bottom of the wall early in the construction process. These mats show values well within the design envelope once the construction has progressed. It is concluded that these higher values of K can be attributed to residual compaction stresses, and are not of concern. Another note is that a proposed change to the AASHTO design envelope would shift the envelope to the right so the majority of the values of K calculated would be within the adjusted envelope.

- The vertical stress distribution followed a pattern similar to other instrumented MSE walls, with low vertical stresses near the face of the wall, stresses increasing to a maximum value approximately 6 ft (1.83 m) from the wall face, then decreasing to the stress expected from overburden ($\sigma_v = \gamma h$) at some distance from the wall face.

- Minimal internal deformations were measured. Data collected from the horizontal extensometers showed that the wall essentially moved as a rigid body, with minimal differential movement of extensometers located near the face of the wall when compared to extensometers located some distance into the wall. Minimal differential movement occurred between extensometers located 4 ft (1.22 m) from the wall face and extensometers located 16 ft (4.88 m) from the wall face. There is more differential movement within the soil mass from the wall face to a distance of 4 ft (1.22 m) from the face, possibly due to the fact that less compaction energy was allowed close to the wall face. The overall movement of the extensometers was on the same order as the movement of the entire wall measured by the vertical inclinometer measurements, again confirming the rigid movement of the wall. On average, the vertical inclinometers measured a horizontal displacement of 3.5 inches (89 mm) at the base of the wall. Extensometers in the same general area also near the base of the wall showed 3 inches (76 mm) of movement 16 ft (4.88 m) from the wall face, with increasing movement toward the face of the wall. Extensometer measurements showed a decrease in lateral movement moving from the base of the wall to the top of the wall, with incremental movements decreasing near the base of the wall throughout the construction process. Some deformations were monitored in the wall face near the toe of the wall, but these deformations were determined to be localized and not indicative of global instability in the wall.

- Additional findings were made relating to the internal and external displacements of the wall. Vertically, during construction, the wall settled approximately 1.5 ft (0.46 m). Most of this settlement occurred in the two soft clay layers located in the upper 22 ft (6.71 m) of the soil profile beneath the rubble backfill on which the wall was constructed. Survey monuments showed that no measurable settlement occurred outside the wick drain zone, while markers within the wick drain zone verified the settlements measured using the horizontal inclinometers. From the end of primary consolidation until the most recent measurements were taken (around 2.5 years), only 0.3 inches (0.025 ft or 7.5 mm) of wall settlement has occurred. This deformation is due to secondary consolidation of the foundation soils, and will continue to be monitored for a number of years.

7.2.2 Conclusions Regarding Wall Movement

Some conclusions relating to the horizontal displacement of the wall were made.

- During construction, horizontal movements near the base of the wall within the wick drain zone were on the order of 3.5 inches (89 mm) as measured by the vertical inclinometers and the horizontal extensometers, while horizontal movements outside the wick drain zone at the same ground elevation were on the order of 0.3 inches (7.6 mm) as measured by a vertical inclinometer. Thus, minimal horizontal movement of the foundation soils occurred outside the wick drain zone. Also, much of the measured horizontal movement occurred within the two soft clay layers directly beneath the wall backfill. Since the end of construction, minimal horizontal movement has taken place in the foundation soils, with slight horizontal movement within the wall.

- Measurements relating to wall rotation have been investigated. Rotation of the wall increased during construction to a maximum of approximately 0.18 degrees during the time in which the surcharge was applied to the wall as calculated from horizontal inclinometer measurements. Wall rotation appears to be following secondary consolidation behavior with some additional rotation in the years following construction. However, this additional rotation has been quite minimal (on the order of 0.02 degrees), such that the total rotation is on the order of 0.20 degrees at the most recent (October 2002) set of readings obtained.

- Some differences were noted in comparing the section of the wall containing only primary reinforcement to the section of the wall containing both primary and intermediate reinforcement. As the primary purpose of the intermediate reinforcement was to reduce the excessive bulging that had been noted near the base of several other walls, steps were taken to monitor this bulging during construction for both sections of the wall. In the section containing only primary reinforcement, a bulge on the order of 4 inches (102 mm) developed during wall construction and extended over a fairy large distance (approximately 17 ft (5.18 m)). The maximum bulge found in the section containing both primary and intermediate reinforcement was only 2.7 inches (69 mm) and was only prominent for a distance of approximately 4 ft (1.22 m). Thus, it appears that the addition of intermediate reinforcement did reduce the bulging near the toe of the wall significantly. The only other substantial comparison to be made is of the tensile stresses within the bar mats, where it appears the section containing both primary and intermediate reinforcement was subjected to higher tensile stresses than the section with only primary reinforcement. One possible reason for this is that the section with additional reinforcement is behaving more rigidly, such that less internal deformation takes place. This causes the soil to stay closer to the at-rest condition, such that stresses in the soil are higher than for soil allowed to deform and move toward the active state. These increased stresses in the soil are transferred to the reinforcement, causing the increased stresses to be observed in the section with additional reinforcement.

7.2.3 Overall Conclusion

Overall, the behavior of the wall throughout construction and in the years following completion of the wall is very good. Results of this study show that there is adequate reinforcement within the wall, with stresses in the reinforcement being well below the allowable. Both sections of the wall have been determined to be internally stable, with some minimal movement near the wall face determined to be localized movement and not due to internal instability. The wall has also been found stable externally, with continued measurements of global movement to be taken to ensure minimal change over time. The expected large primary settlement of the wall did occur, with only minimal secondary settlement having taken place. Finally, the localized deformations near the face of the wall are indicative of very localized movement, and are not indicative of instability of the overall wall system.

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APPENDICES

Appendix A

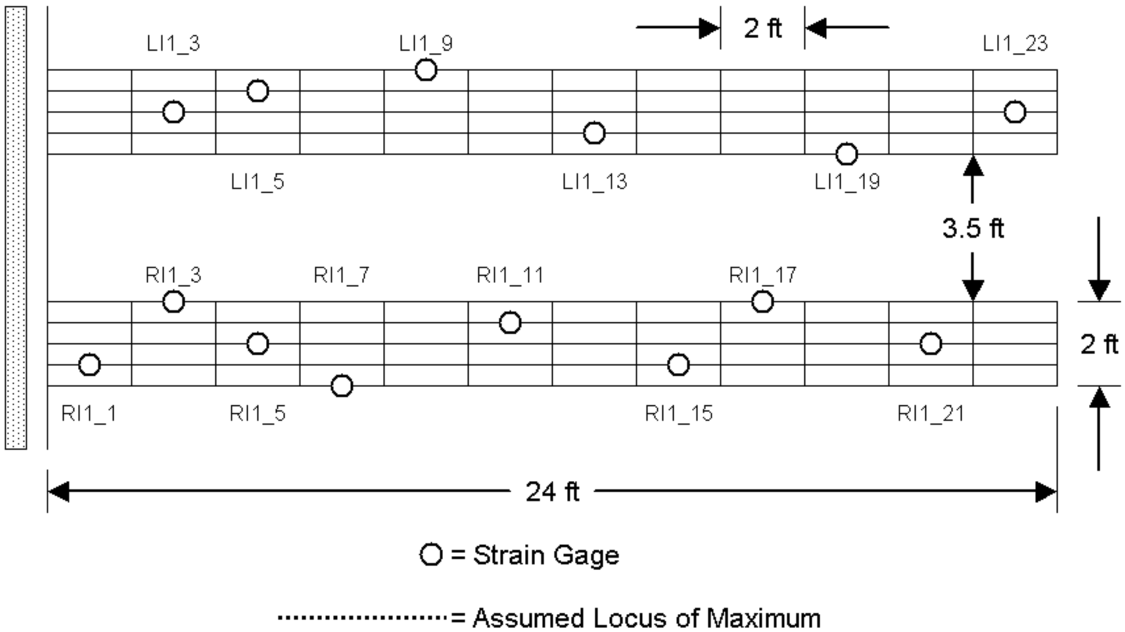

Figure A1. Plan view of instrumented primary bar mat IL1 at level 1 located in the intermediate and primary reinforced section.

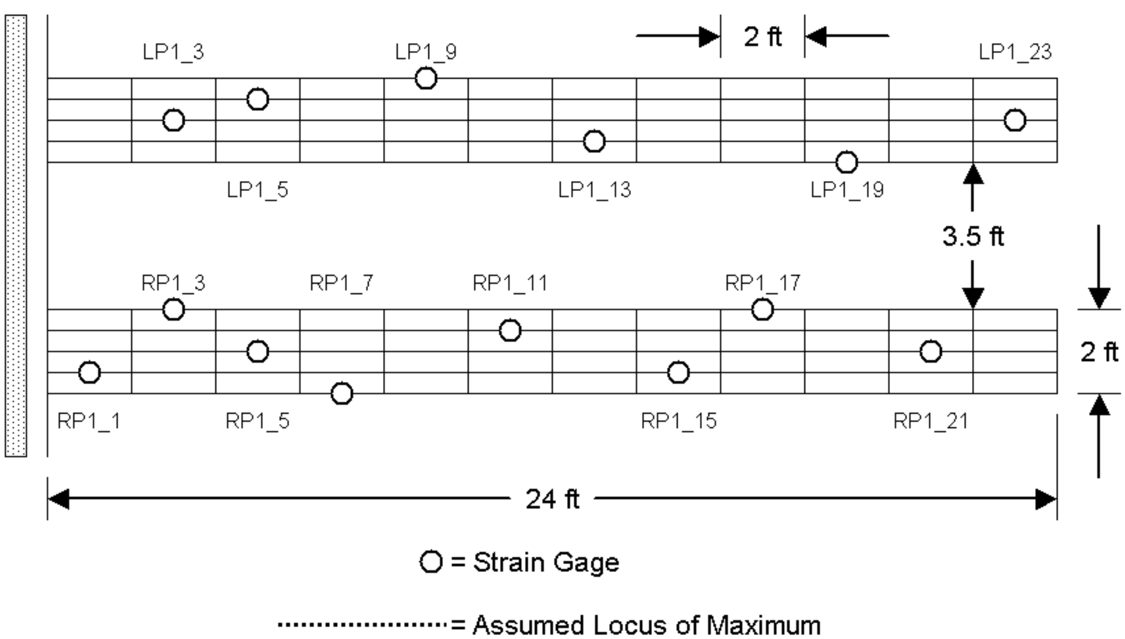

Figure A2. Plan view of instrumented primary bar mat PL1 at level 1 located in the primary reinforced only section.

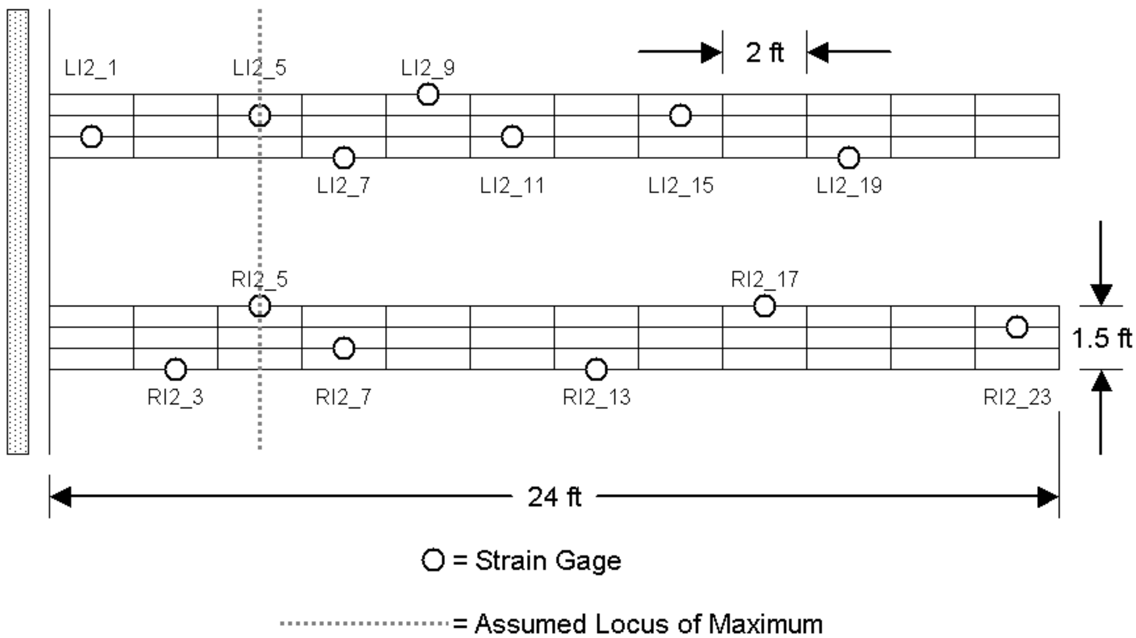

Figure A3. Plan view of instrumented primary bar mat IL2 at level 2 located in the intermediate and primary reinforced section.

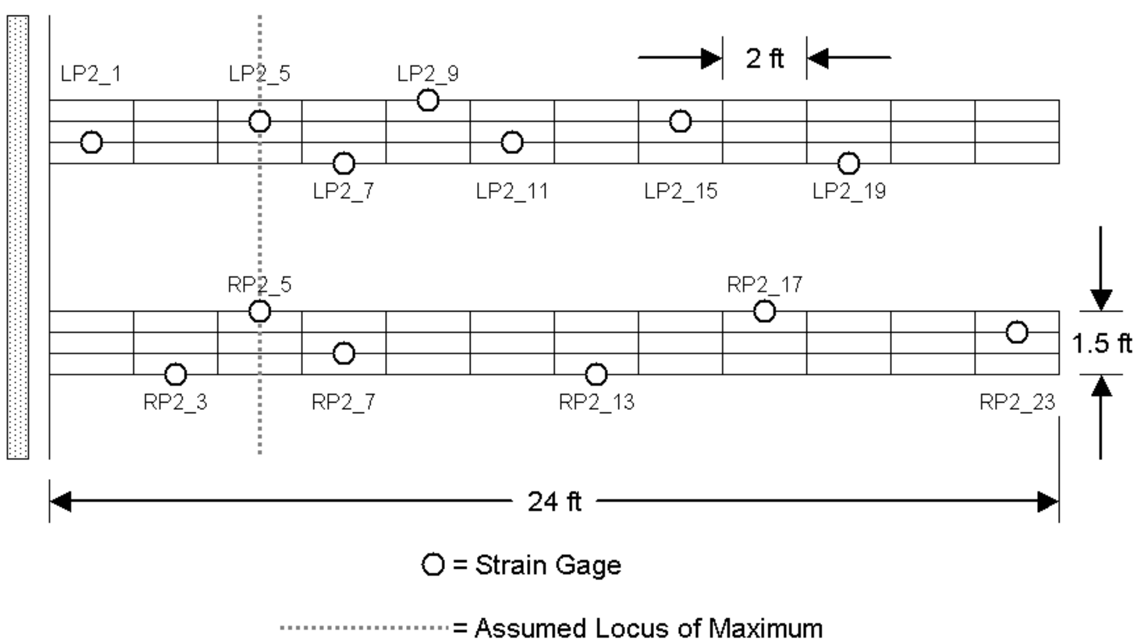

Figure A4. Plan view of instrumented primary bar mat PL2 at level 2 located in the primary reinforced only section.

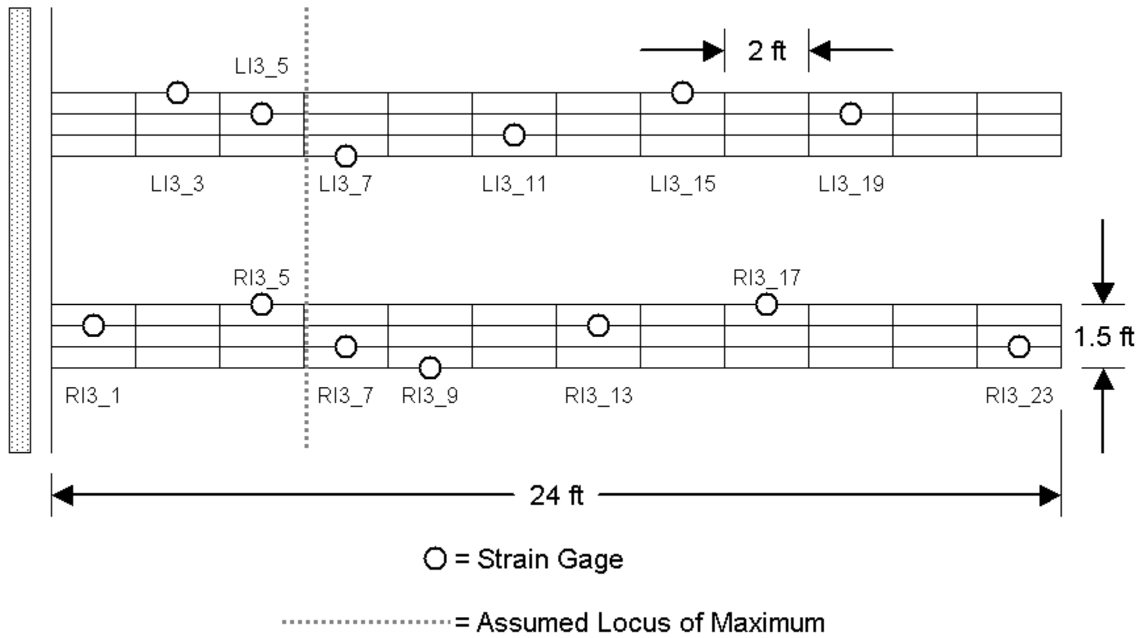

Figure A5. Plan view of instrumented primary bar mat IL3 at level 3 located in the intermediate and primary reinforced section.

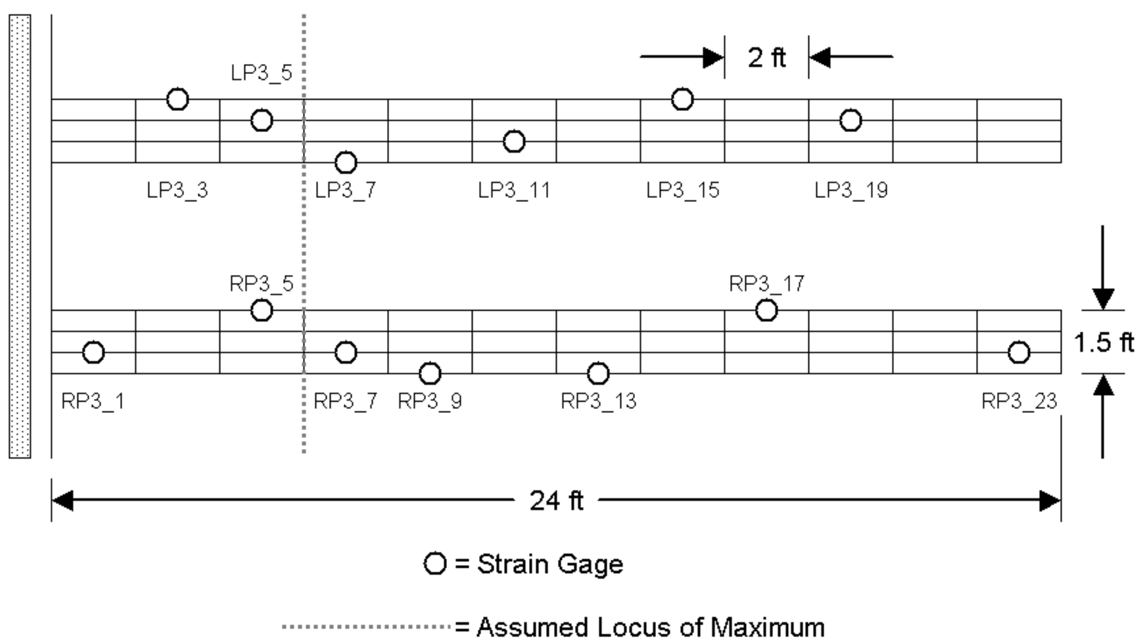

Figure A6. Plan view of instrumented primary bar mat PL3 at level 3 located in the primary reinforced only section.

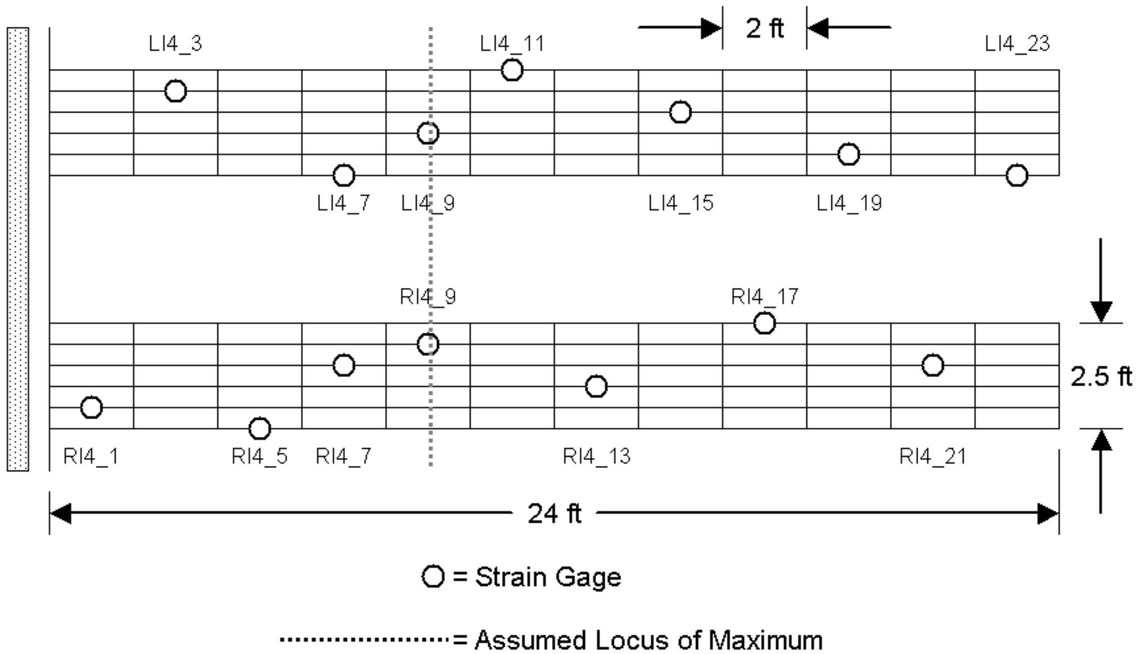

Figure A7. Plan view of instrumented primary bar mat IL4 at level 4 located in the intermediate and primary reinforced section.

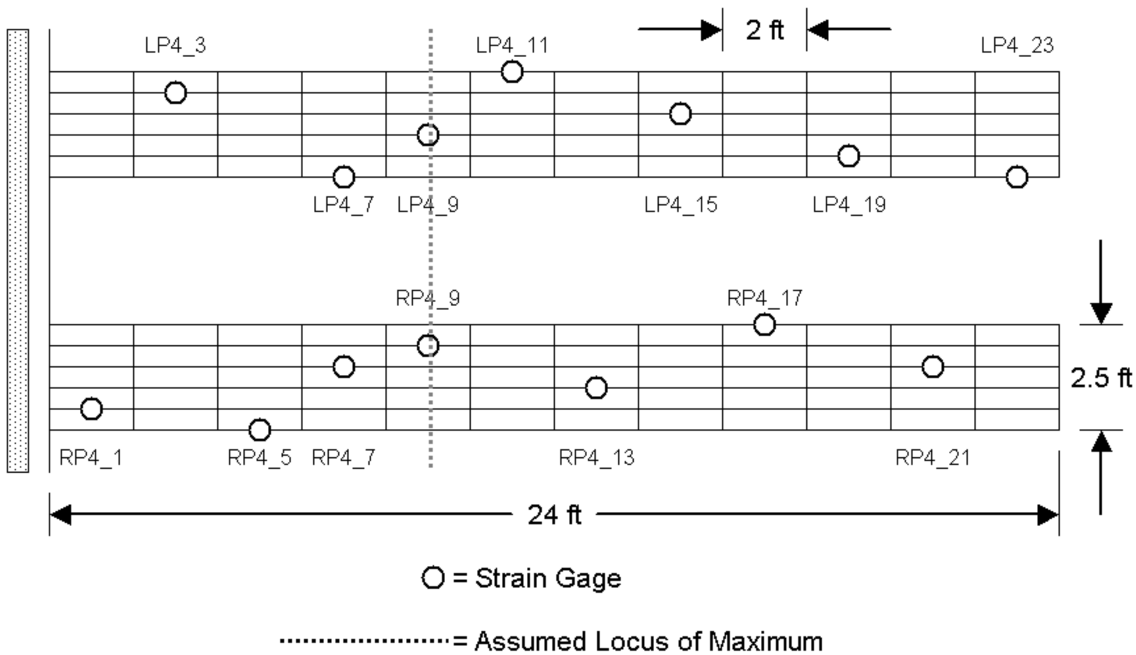

Figure A8. Plan view of instrumented primary bar mat PL4 at level 4 located in the primary reinforced only section.

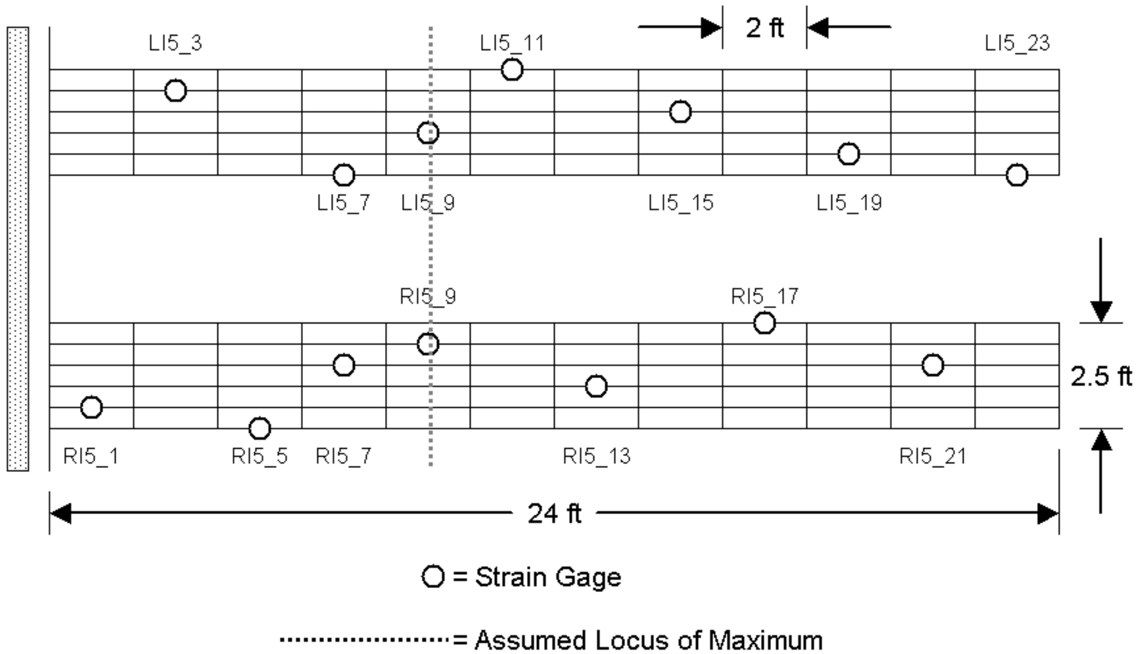

Figure A9. Plan view of instrumented primary bar mat IL5 at level 5 located in the intermediate and primary reinforced section.

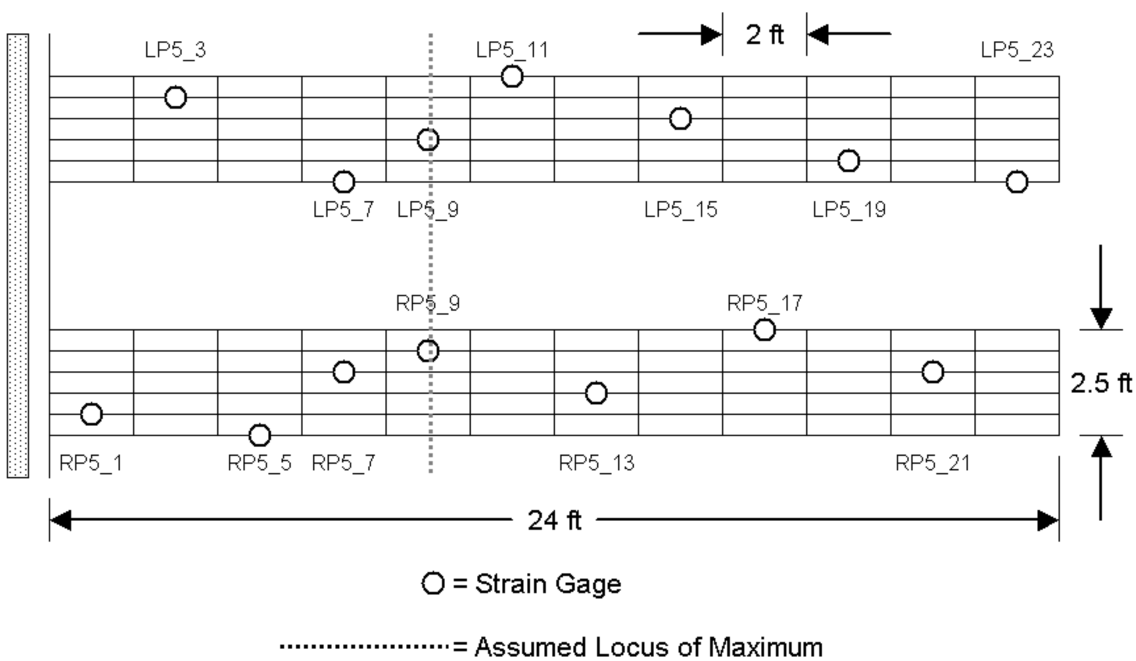

Figure A10. Plan view of instrumented primary bar mat PL5 at level 5 located in the primary reinforced only section.

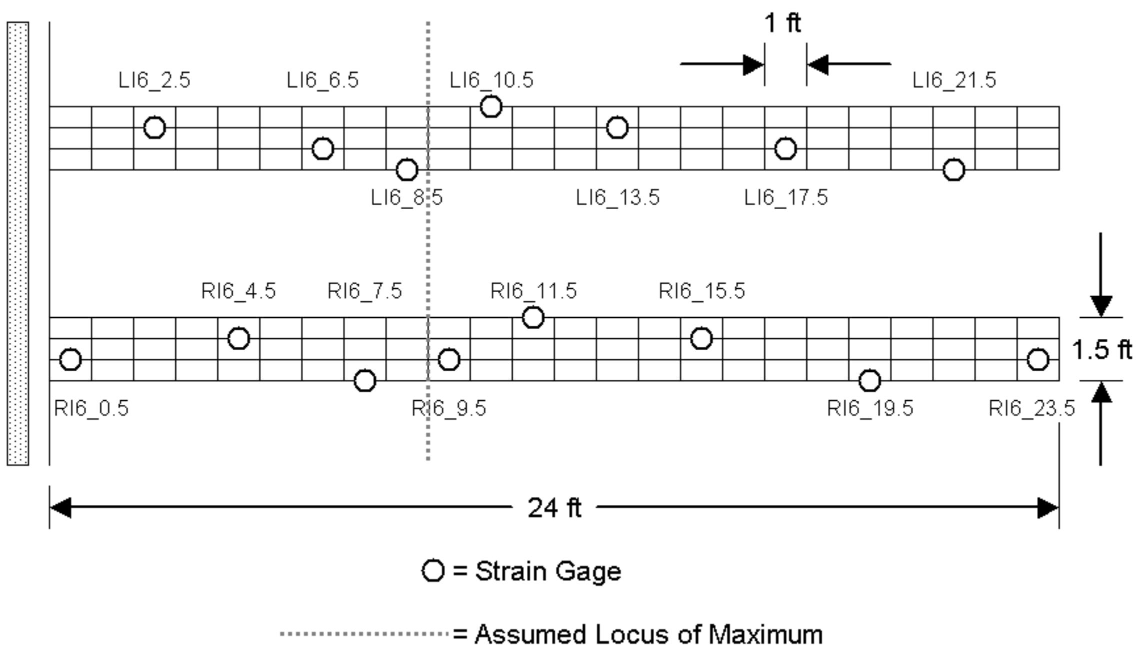

Figure A11. Plan view of instrumented primary bar mat IL6 at level 6 located in the intermediate and primary reinforced section.

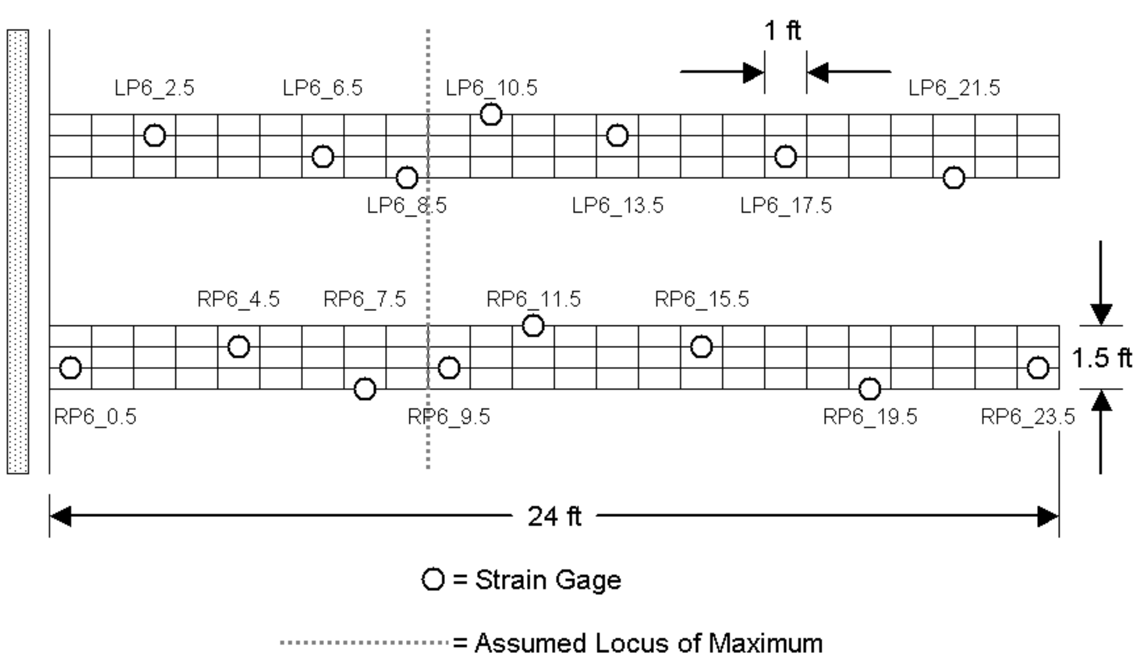

Figure A12. Plan view of instrumented primary bar mat PL6 at level 6 located in the primary reinforced only section.

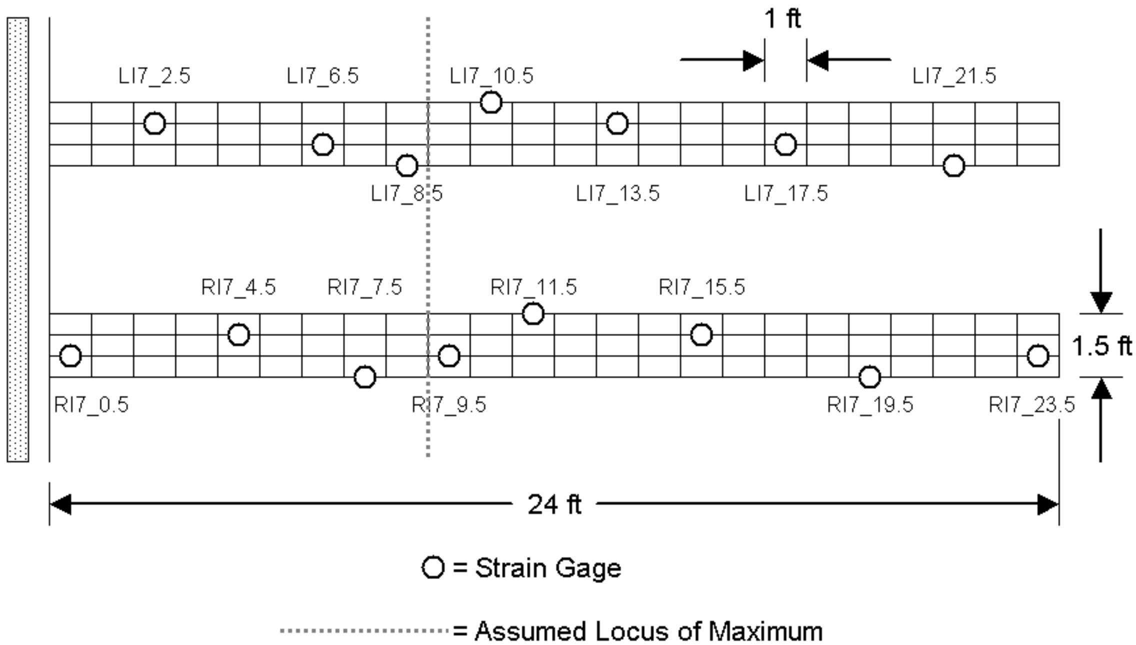

Figure A13. Plan view of instrumented primary bar mat IL7 at level 7 located in the intermediate and primary reinforced section.

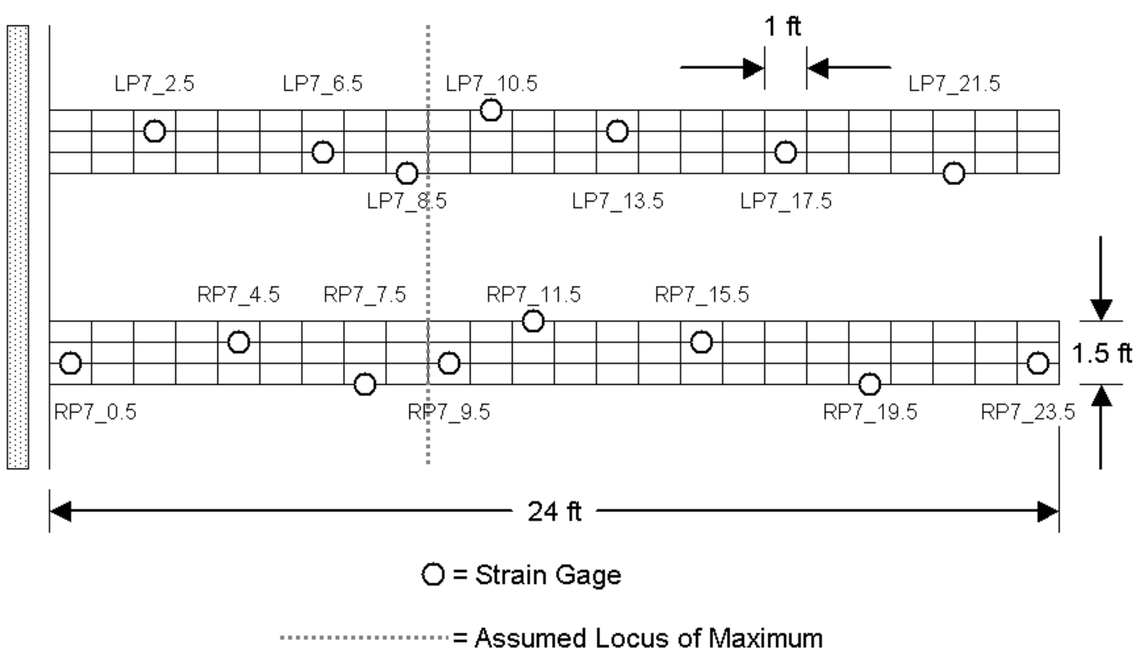

Figure A14. Plan view of instrumented primary bar mat PL7 at level 7 located in the primary reinforced only section.

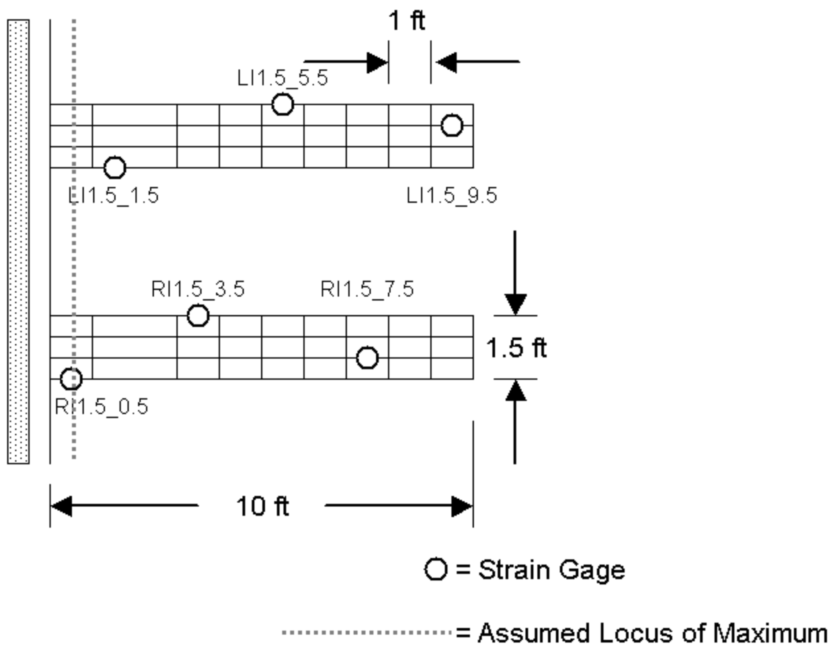

Figure A15. Plan view of instrumented intermediate bar mat IL1.5 at level 1.5 located in the intermediate and primary reinforced section.

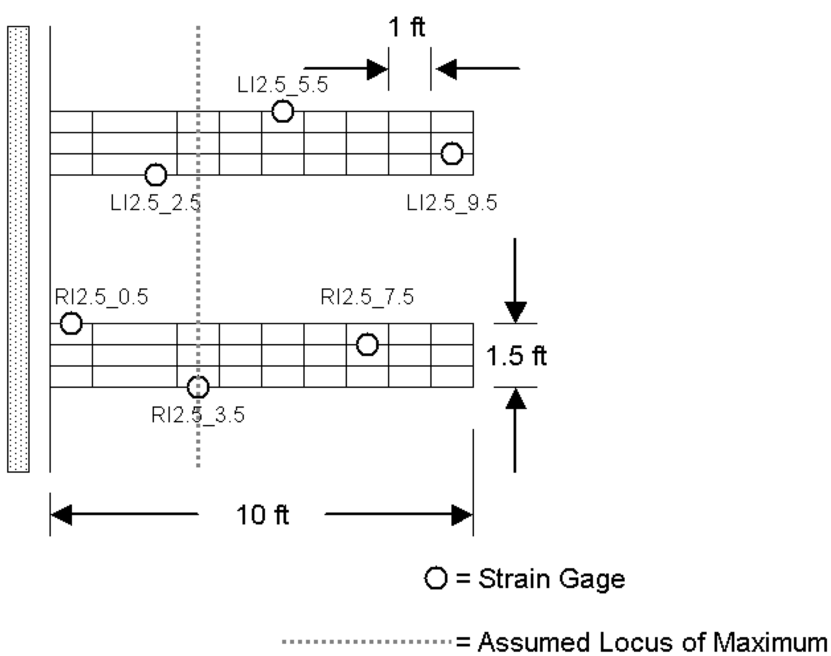

Figure A16. Plan view of instrumented intermediate bar mat IL2.5 at level 2.5 located in the intermediate and primary reinforced section.

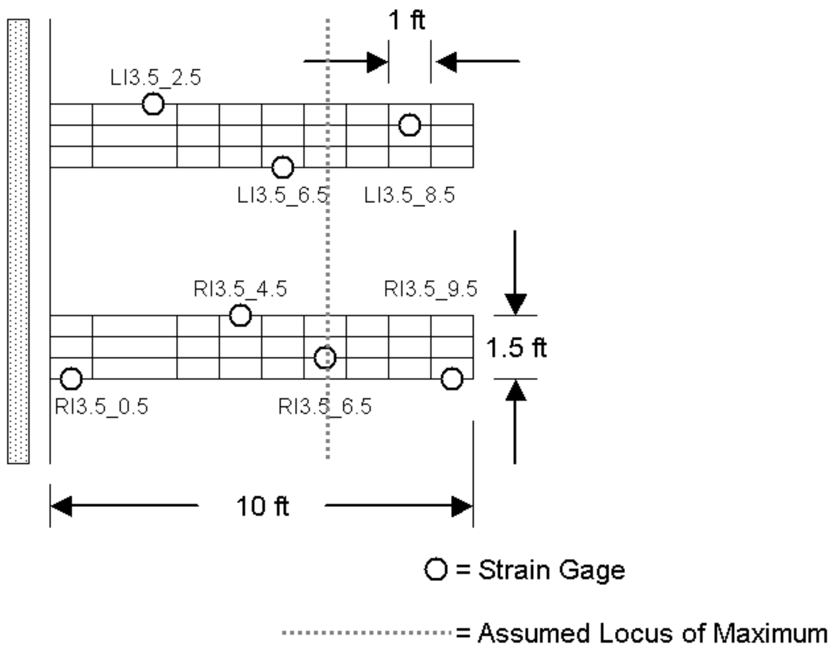

Figure A17. Plan view of instrumented intermediate bar mat IL3.5 at level 3.5 located in the intermediate and primary reinforced section.

Appendix B

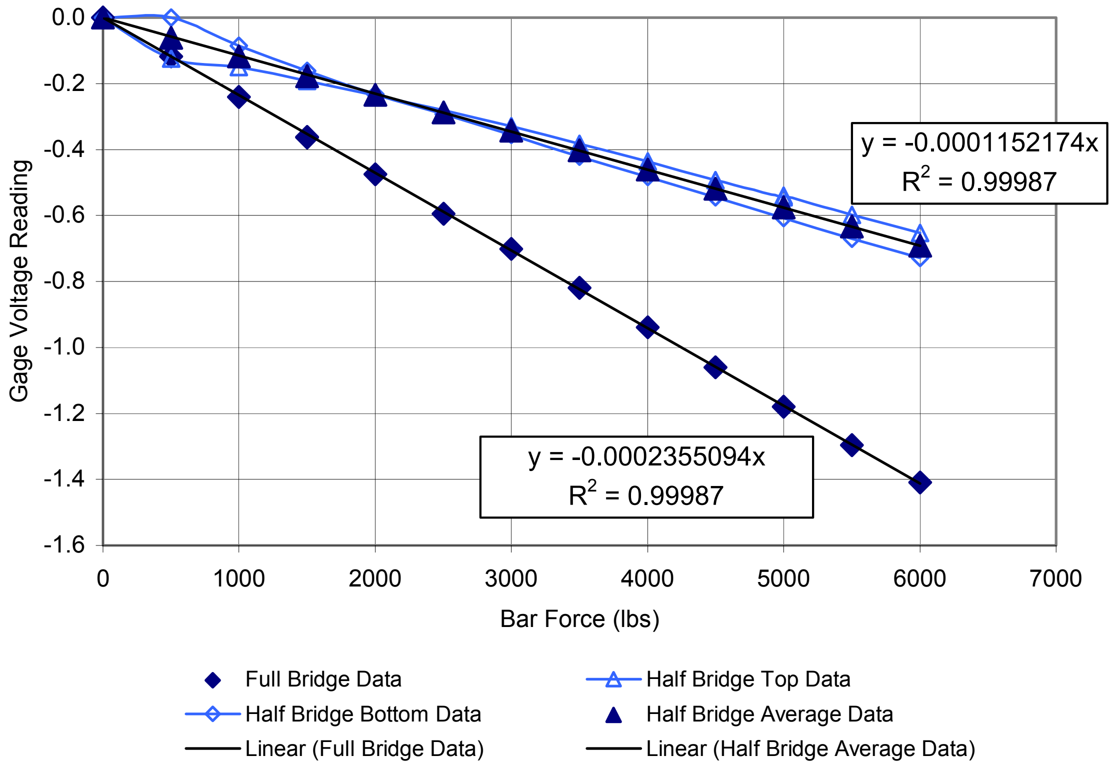

Figure B1. Calibration chart for 0.500 inch (12.7 mm) diameter large bars.

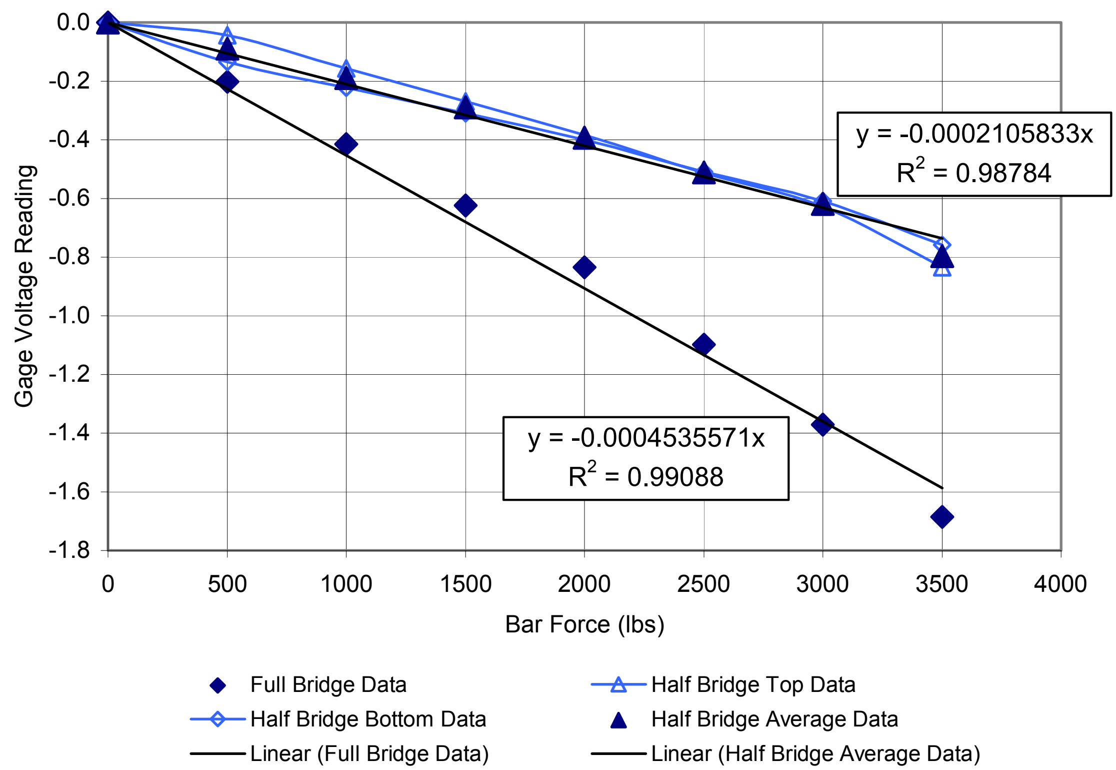

Figure B2. Calibration chart for 0.375 inch (9.525 mm) diameter small bars.

Appendix C

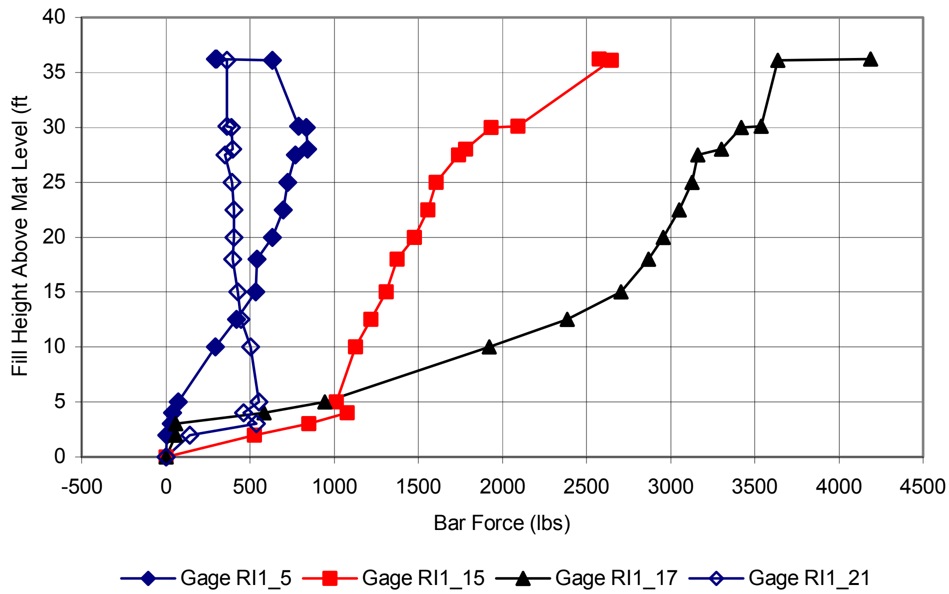

Figure C1. Measured bar force plotted with height of fill above primary mat IL1 located in the intermediate and primary reinforced section.

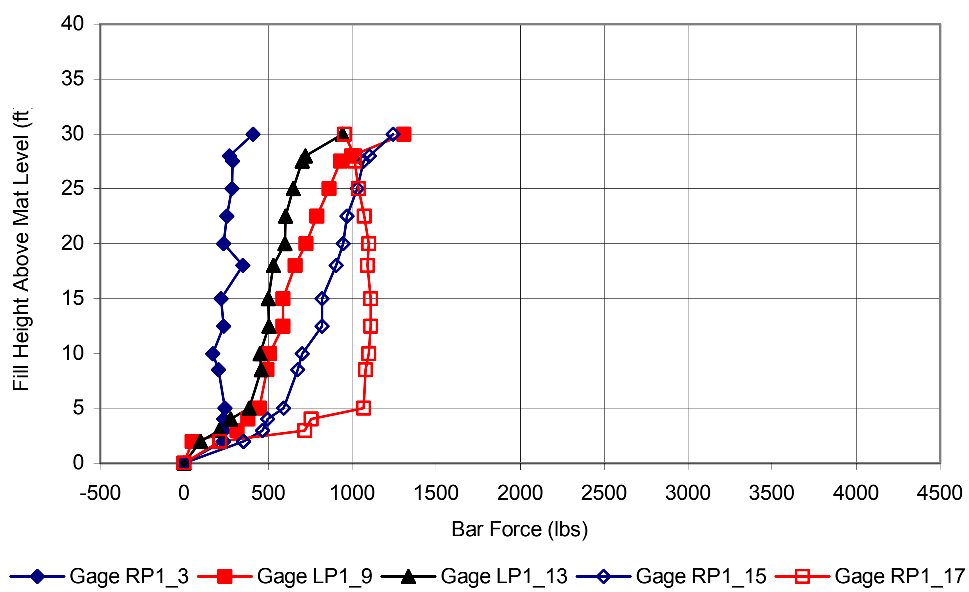

Figure C2. Measured bar force plotted with height of fill above primary mat PL1 located in the primary reinforced only section.

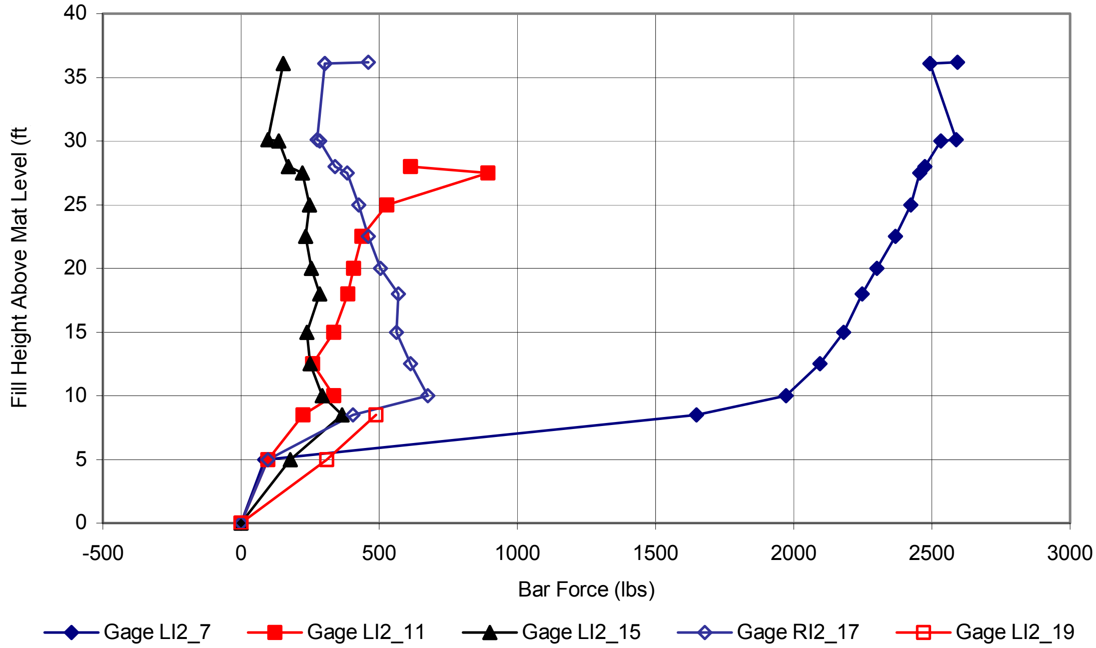

Figure C3. Measured bar force plotted with height of fill above primary mat IL2 located in the intermediate and primary reinforced section.

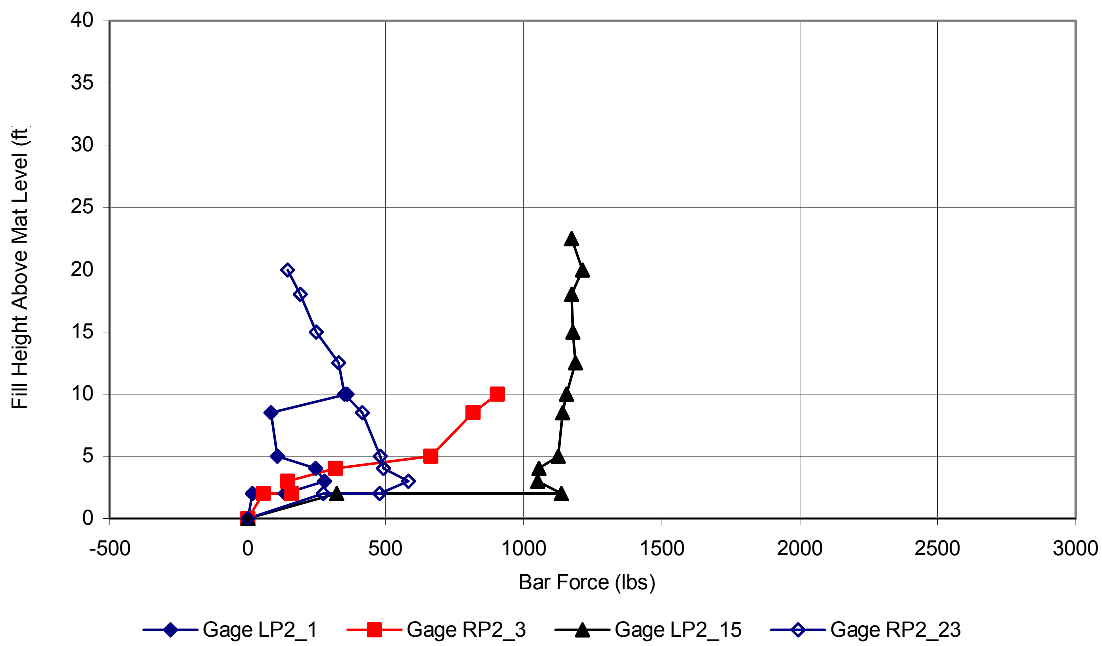

Figure C4. Measured bar force plotted with height of fill above primary mat PL2 located in the primary reinforced only section.

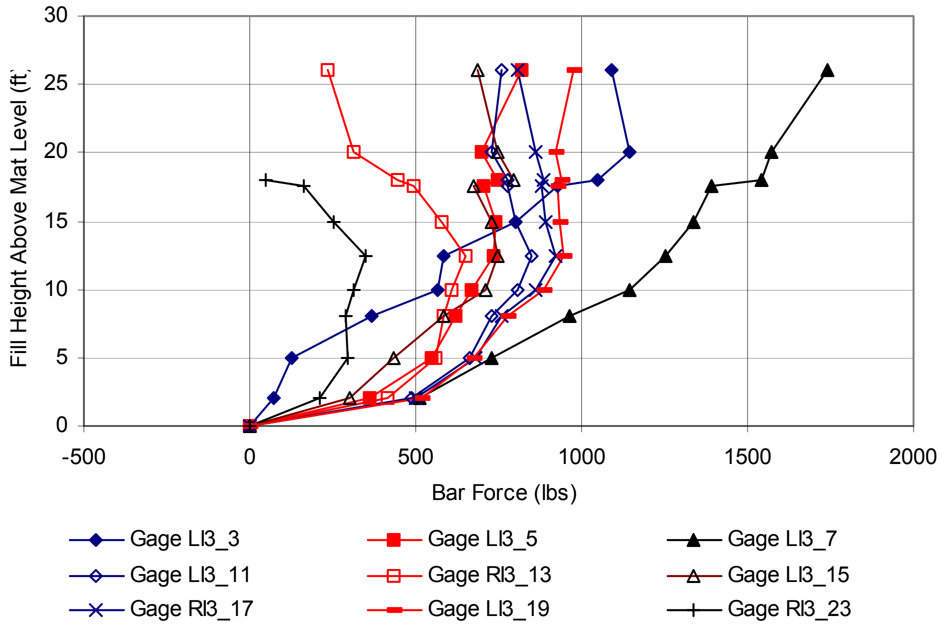

Figure C5. Measured bar force plotted with height of fill above primary mat IL3 located in the intermediate and primary reinforced section.

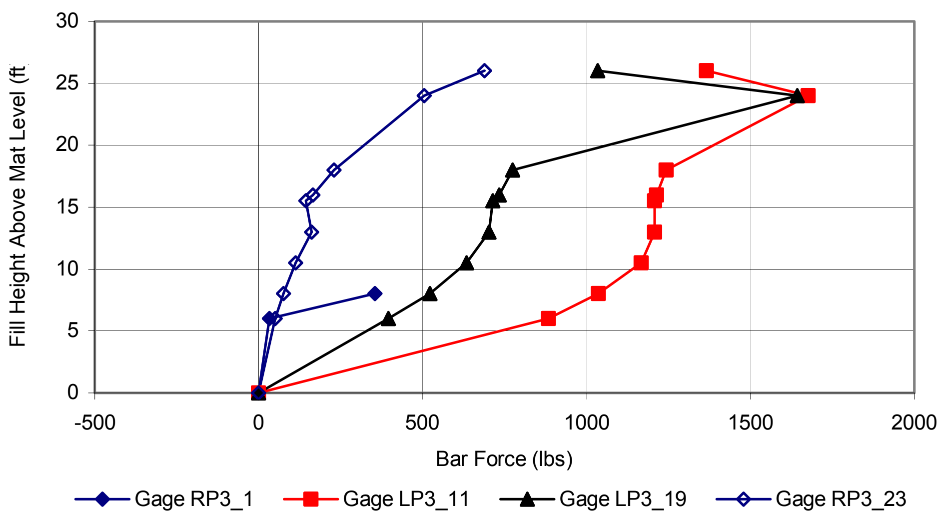

Figure C6. Measured bar force plotted with height of fill above primary mat PL3 located in the primary reinforced only section.

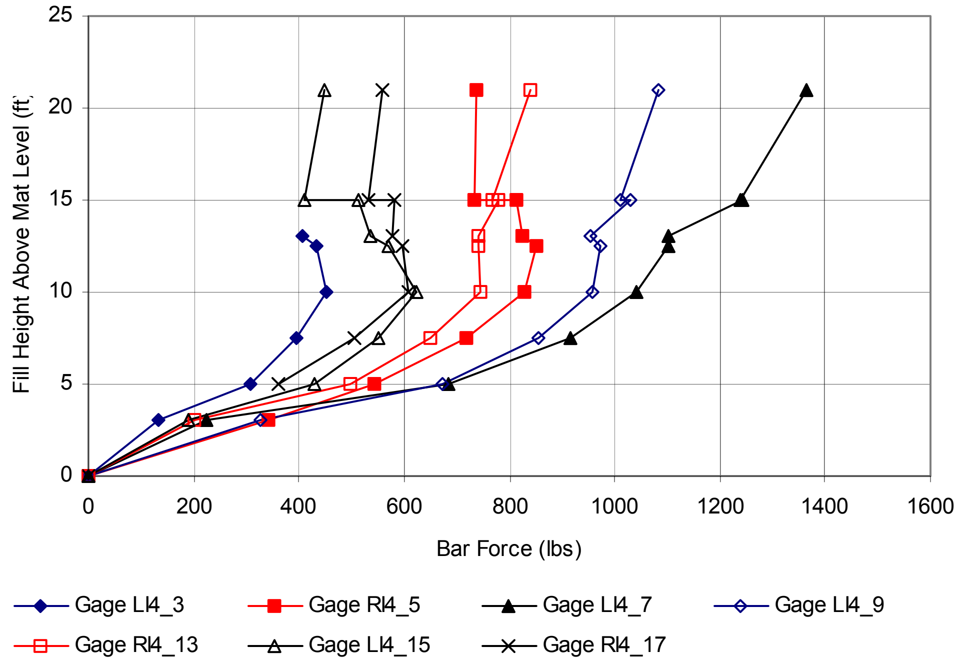

Figure C7. Measured bar force plotted with height of fill above primary mat IL4 located in the intermediate and primary reinforced section.

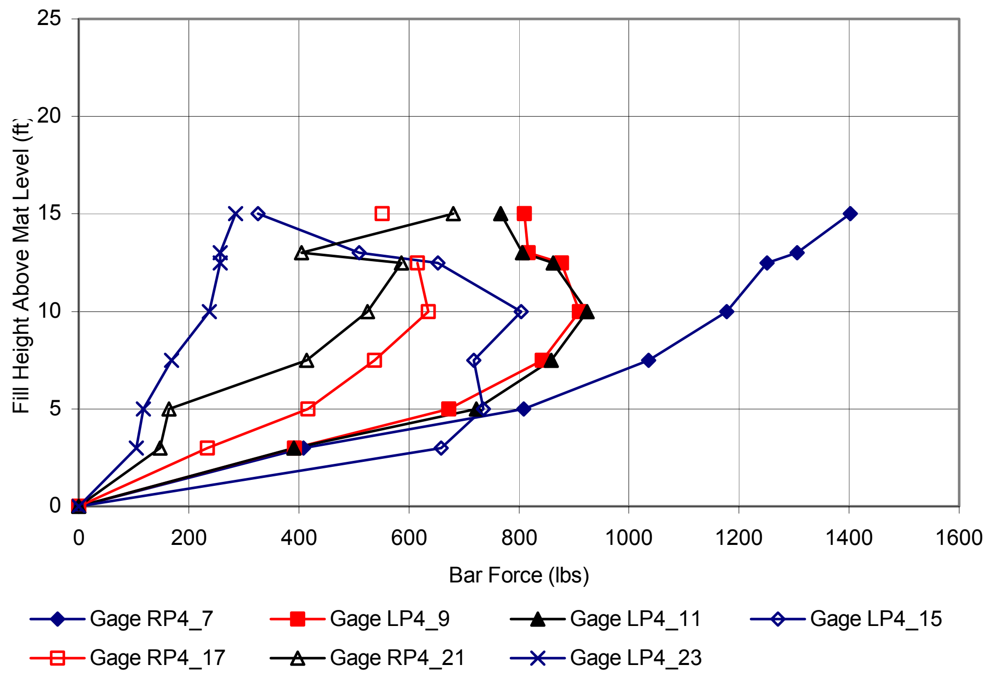

Figure C8. Measured bar force plotted with height of fill above primary mat PL4 located in the primary reinforced only section.

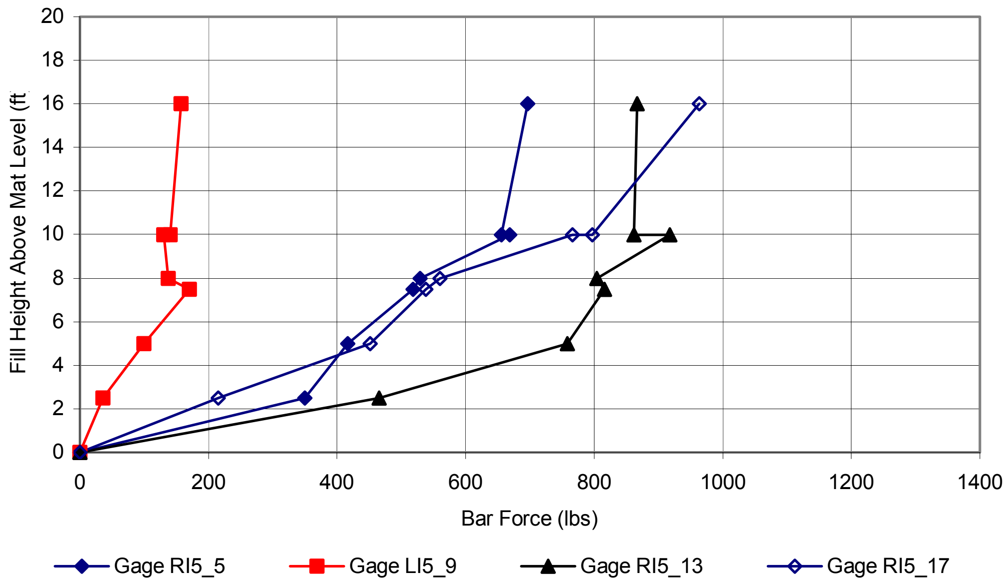

Figure C9. Measured bar force plotted with height of fill above primary mat IL5 located in the intermediate and primary reinforced section.

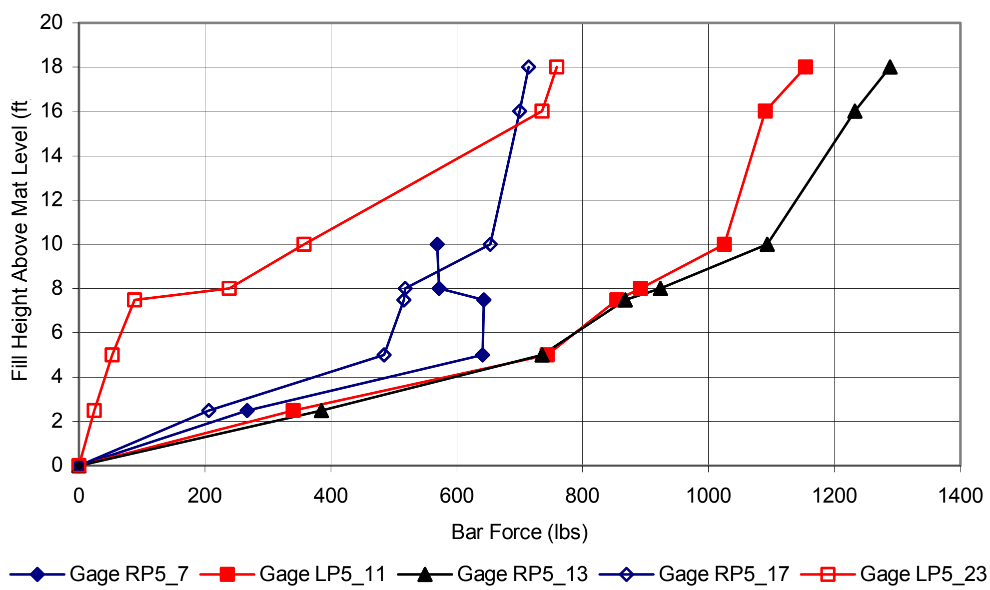

Figure C10. Measured bar force plotted with height of fill above primary mat PL5 located in the primary reinforced only section.

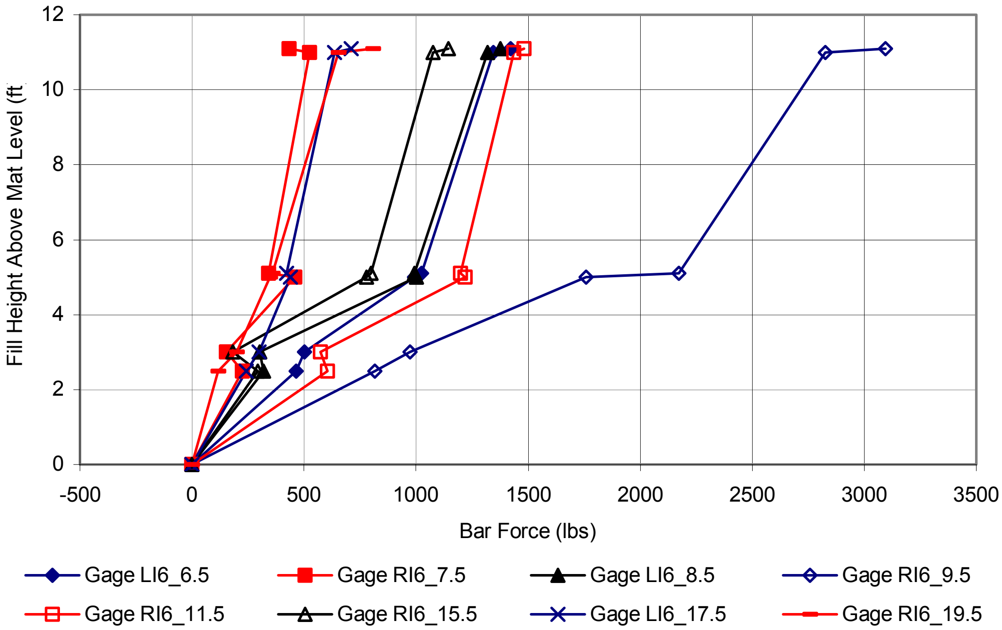

Figure C11. Measured bar force plotted with height of fill above primary mat IL6 located in the intermediate and primary reinforced section.

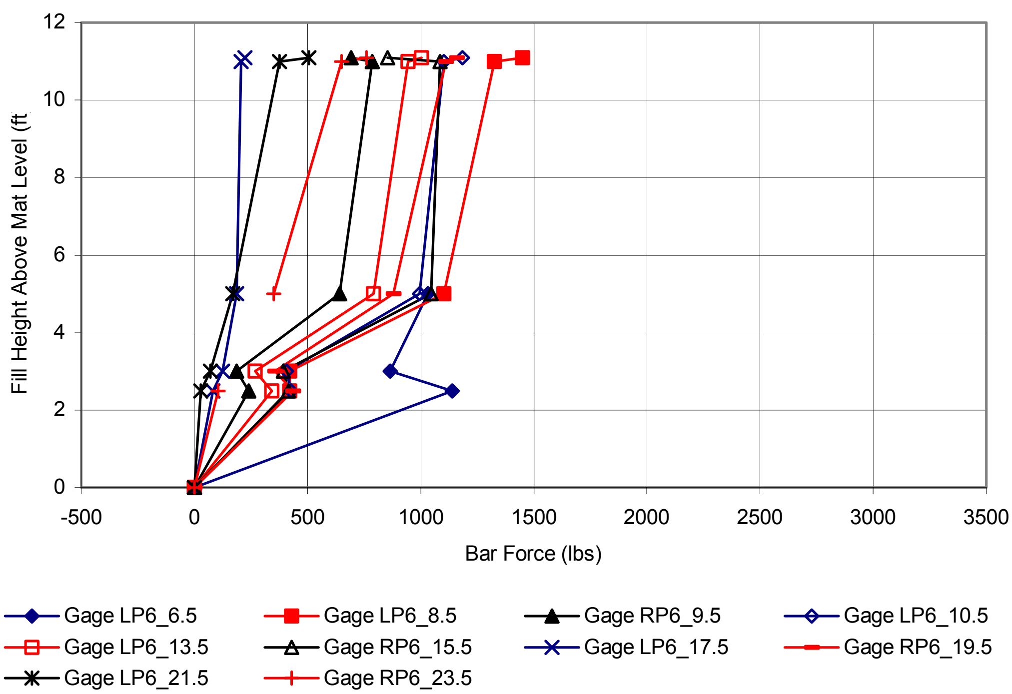

Figure C12. Measured bar force plotted with height of fill above primary mat PL6 located in the primary reinforced only section.

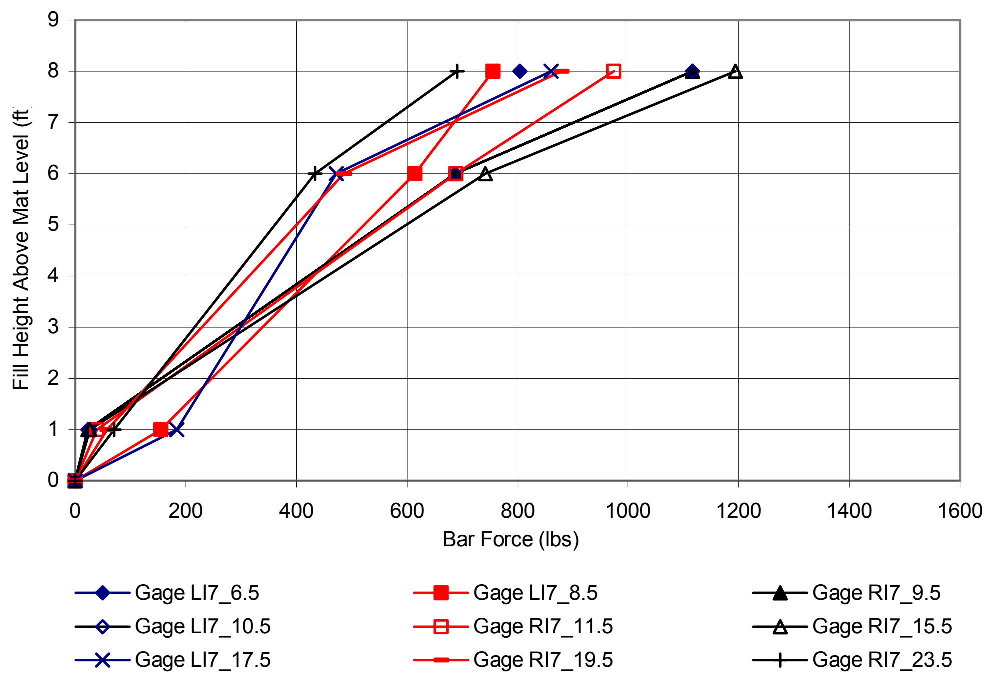

Figure C13. Measured bar force plotted with height of fill above primary mat IL7 located in the intermediate and primary reinforced section.

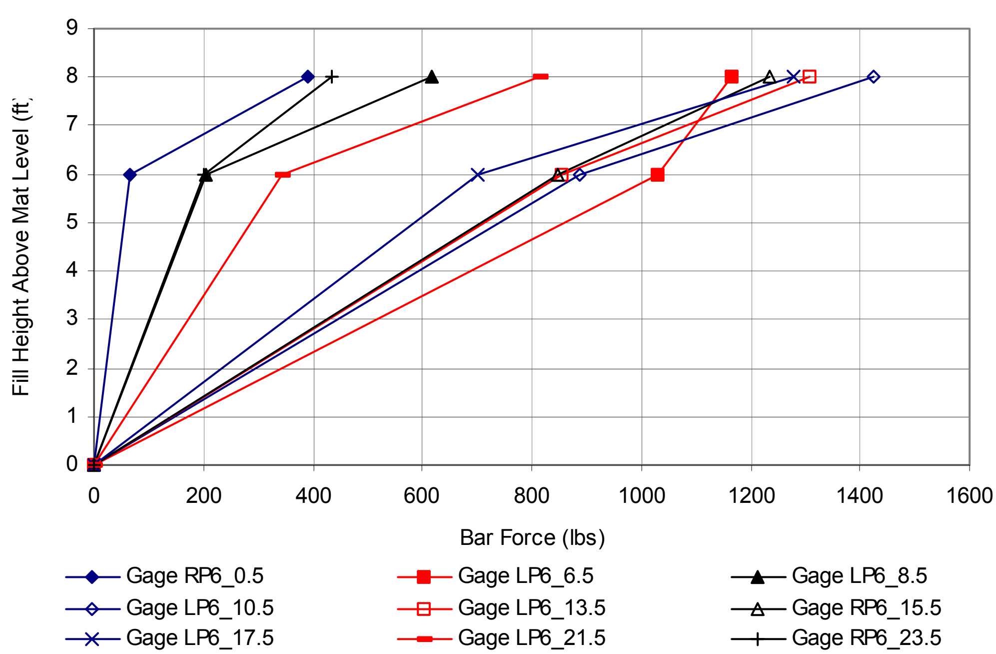

Figure C14. Measured bar force plotted with height of fill above primary mat PL7 located in the primary reinforced only section.

No useable data for IL1.5.

Figure C15. Measured bar force plotted with height of fill above primary mat IL1.5 located in the intermediate and primary reinforced section.

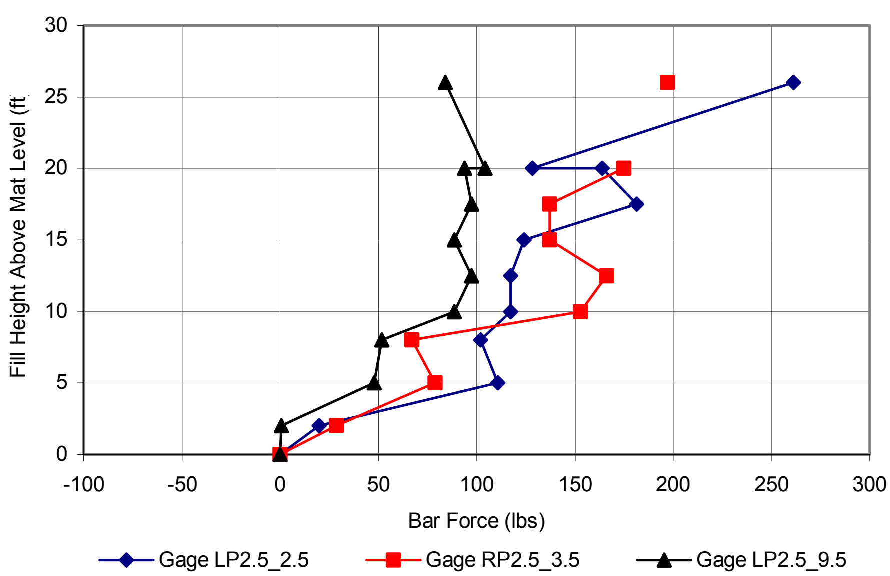

Figure C16. Measured bar force plotted with height of fill above primary mat IL2.5 located in the intermediate and primary reinforced section.

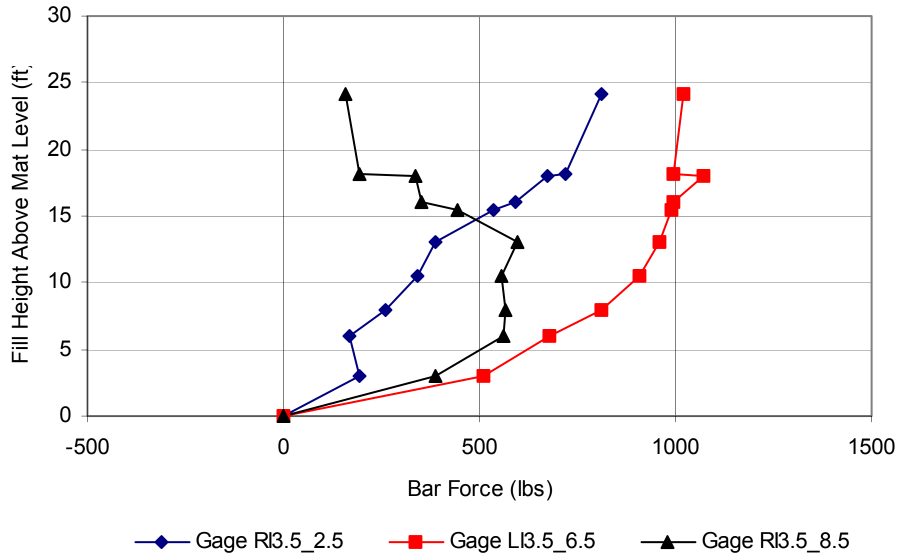

Figure C17. Measured bar force plotted with height of fill above primary mat IL3.5 located in the intermediate and primary reinforced section.

Appendix D

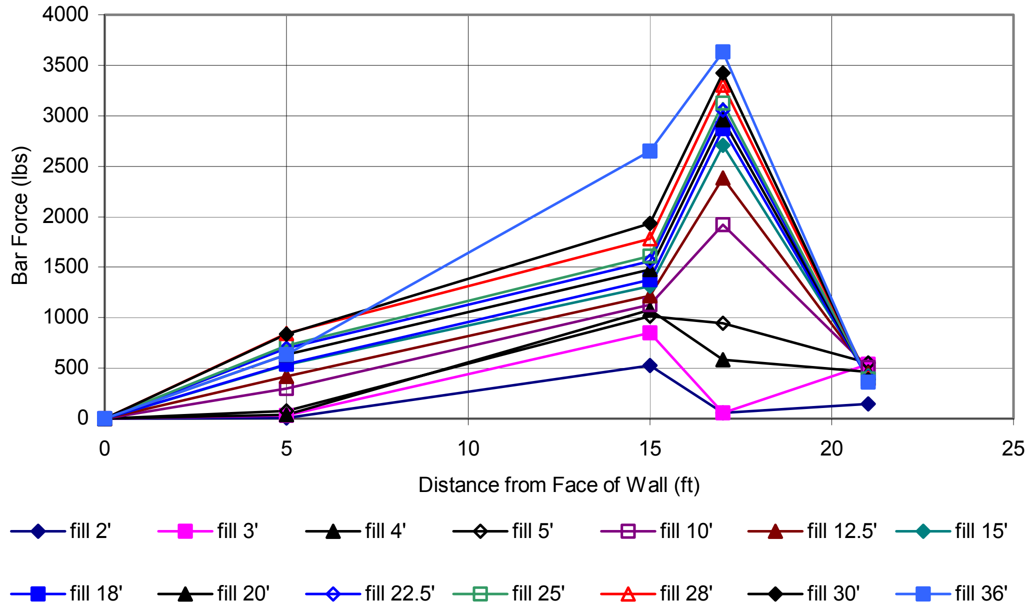

Figure D1. Measured bar forces on mat IL1 plotted with distance from fascia bar mat wall face.

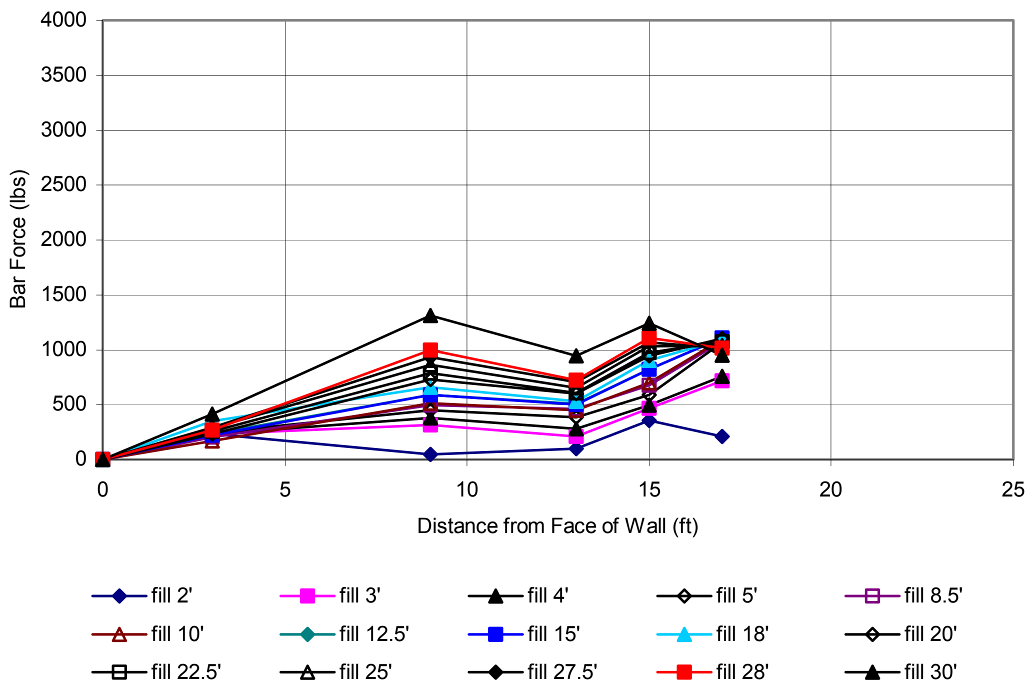

Figure D2. Measured bar forces on mat PL1 plotted with distance from fascia bar mat wall face.

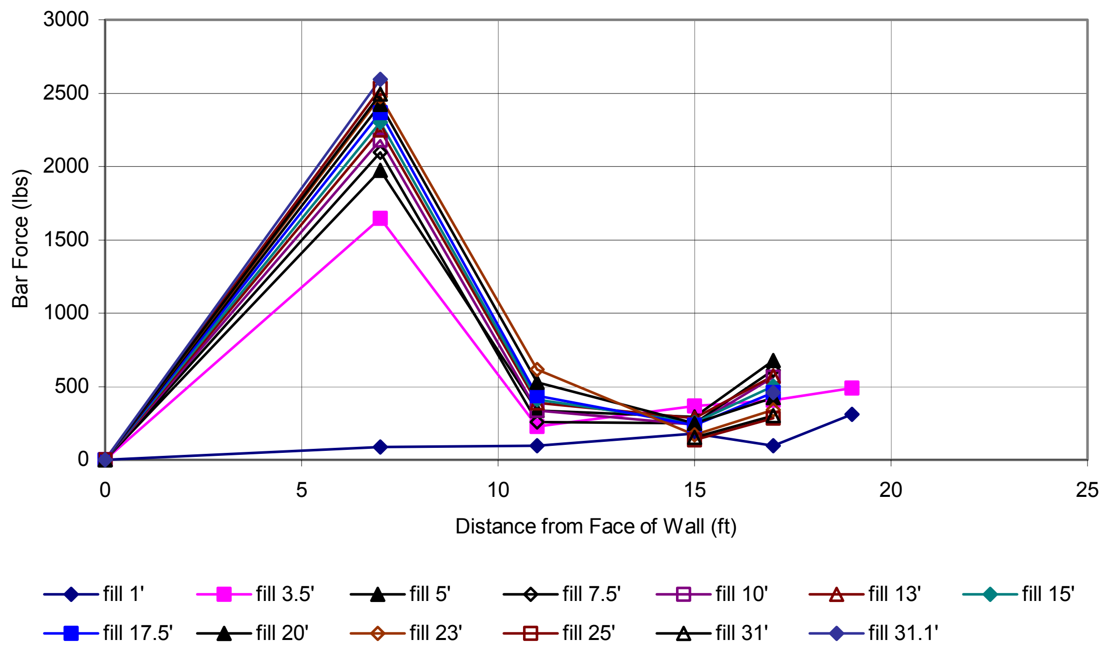

Figure D3. Measured bar forces on mat IL2 plotted with distance from fascia bar mat wall face.

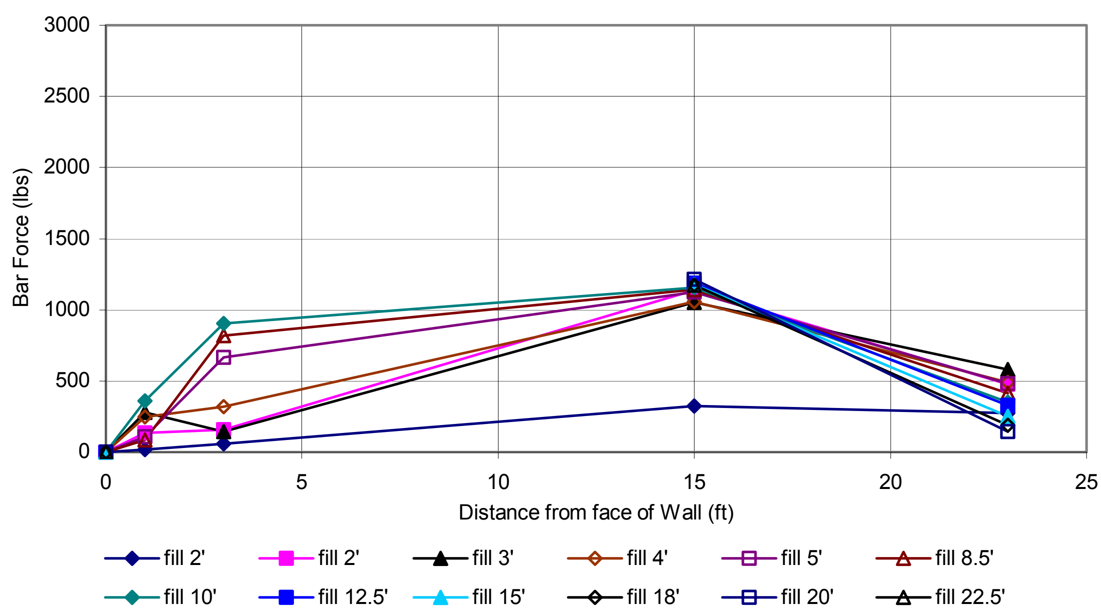

Figure D4. Measured bar forces on mat PL2 plotted with distance from fascia bar mat wall face.

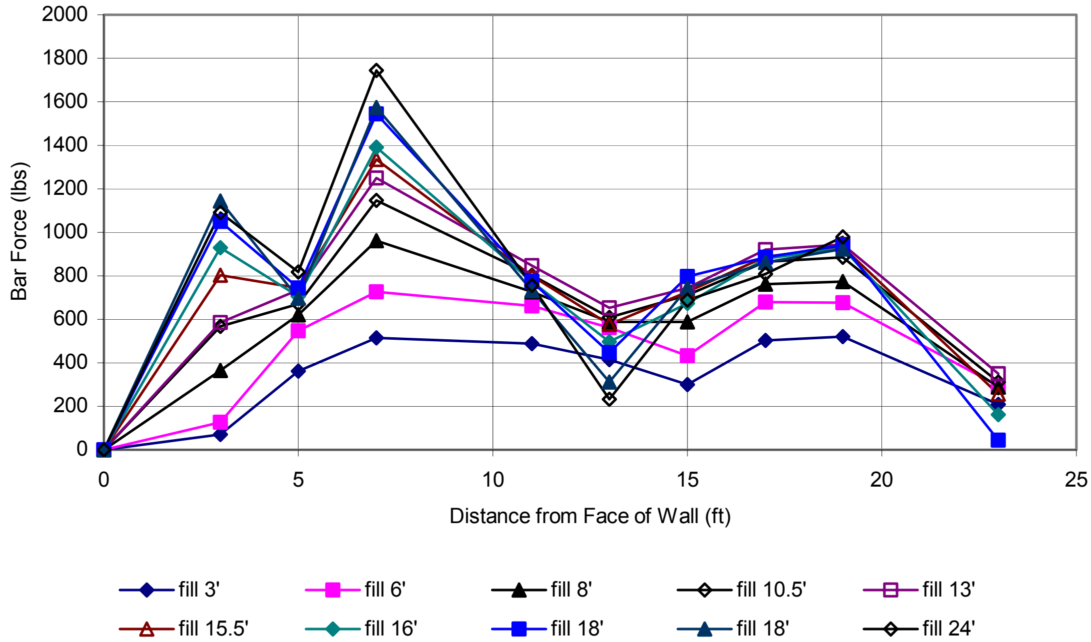

Figure D5. Measured bar forces on mat IL3 plotted with distance from fascia bar mat wall face.

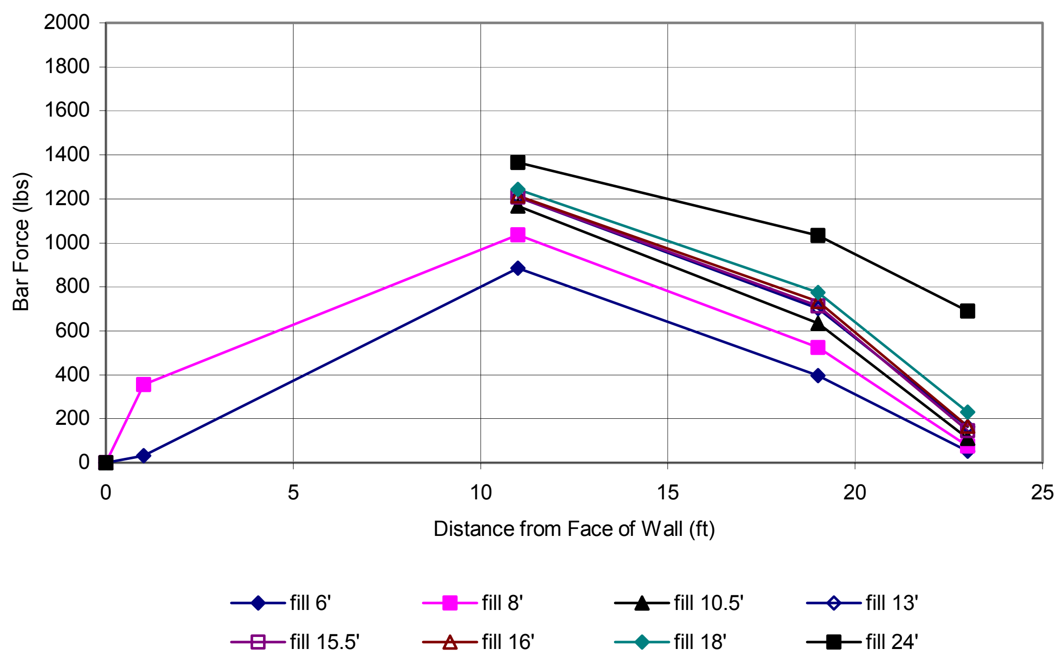

Figure D6. Measured bar forces on mat PL3 plotted with distance from fascia bar mat wall face.

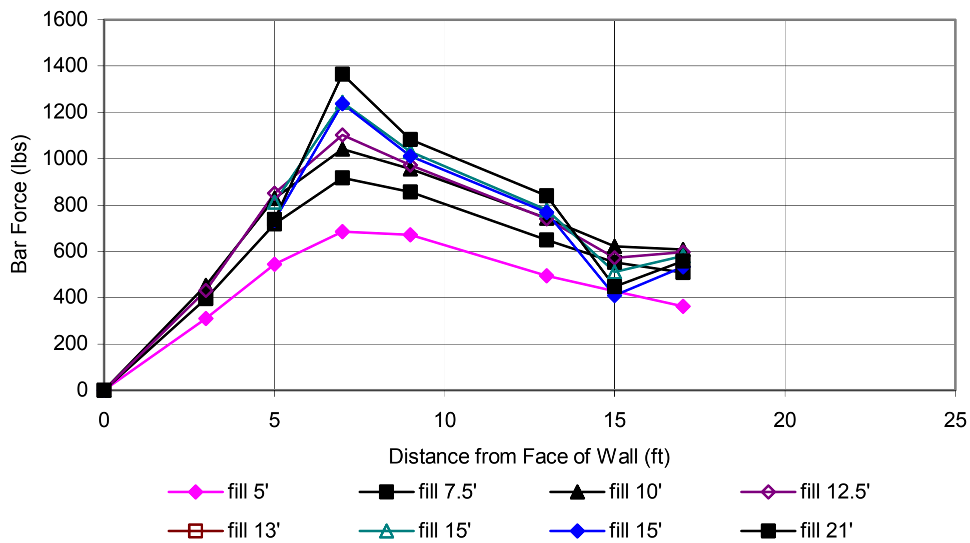

Figure D7. Measured bar forces on mat IL4 plotted with distance from fascia bar mat wall face.

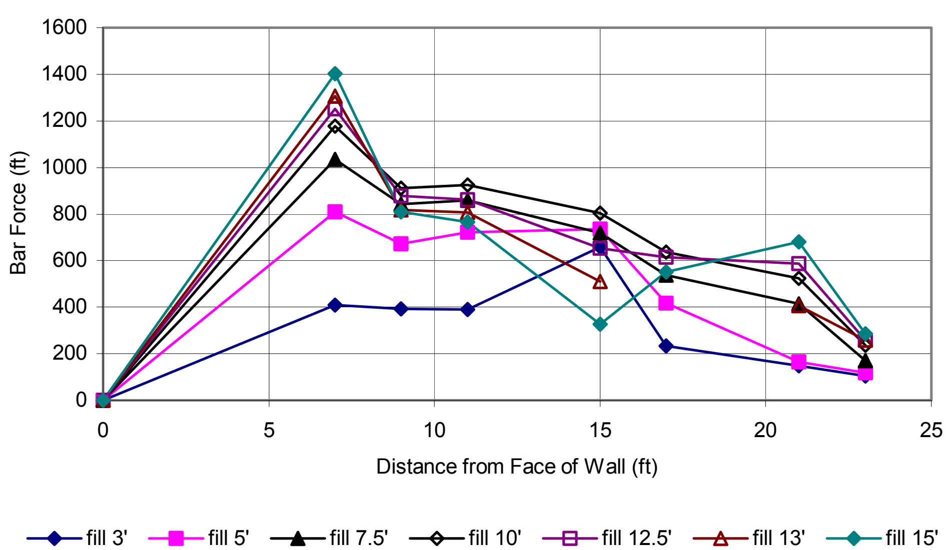

Figure D8. Measured bar forces on mat PL4 plotted with distance from fascia bar mat wall face.

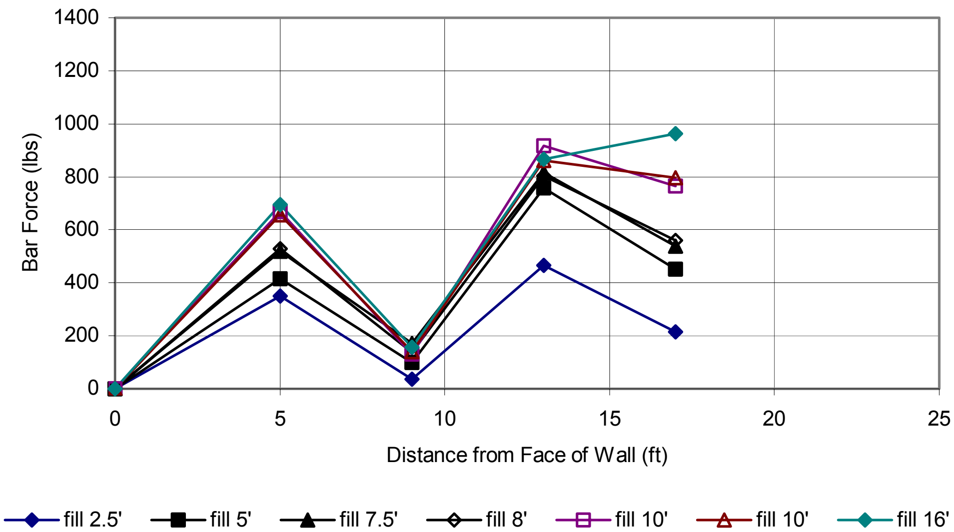

Figure D9. Measured bar forces on mat IL5 plotted with distance from fascia bar mat wall face.

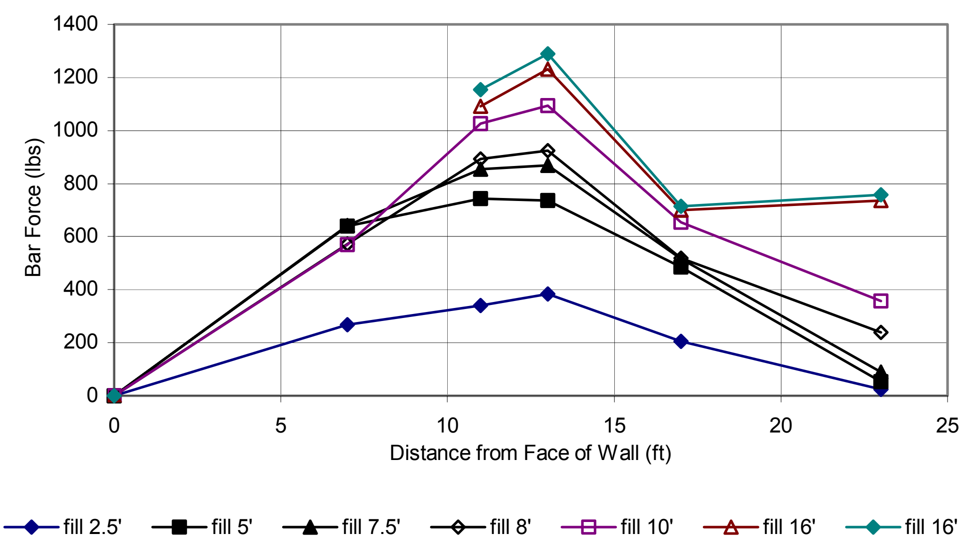

Figure D10. Measured bar forces on mat PL5 plotted with distance from fascia bar mat wall face.

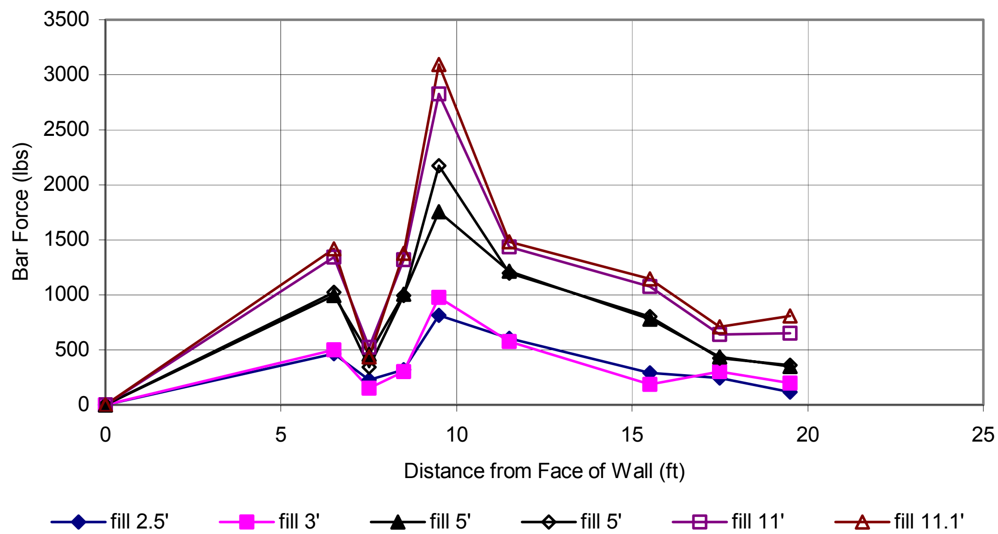

Figure D11. Measured bar forces on mat IL6 plotted with distance from fascia bar mat wall face.

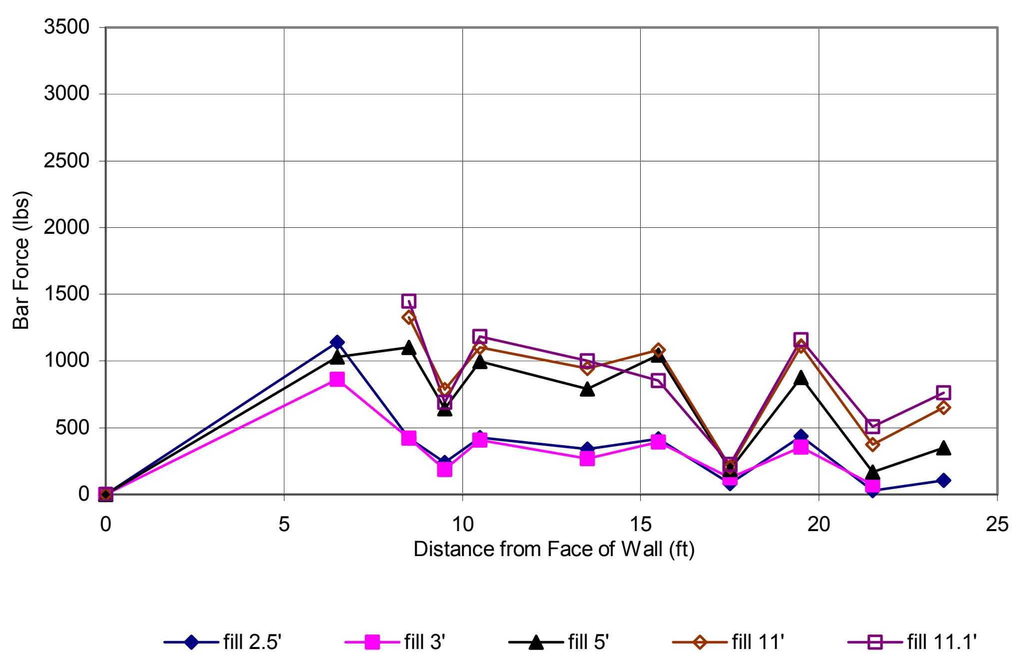

Figure D12. Measured bar forces on mat PL6 plotted with distance from fascia bar mat wall face.

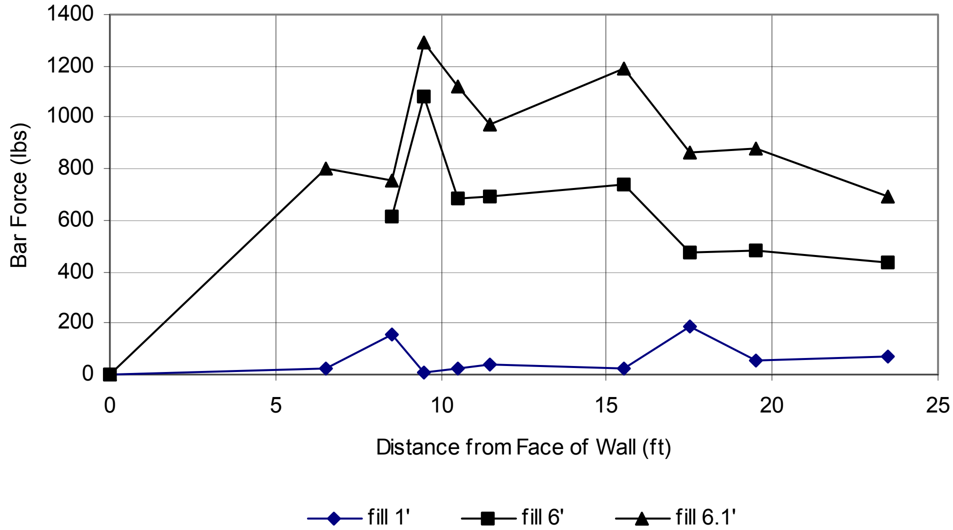

Figure D13. Measured bar forces on mat IL7 plotted with distance from fascia bar mat wall face.

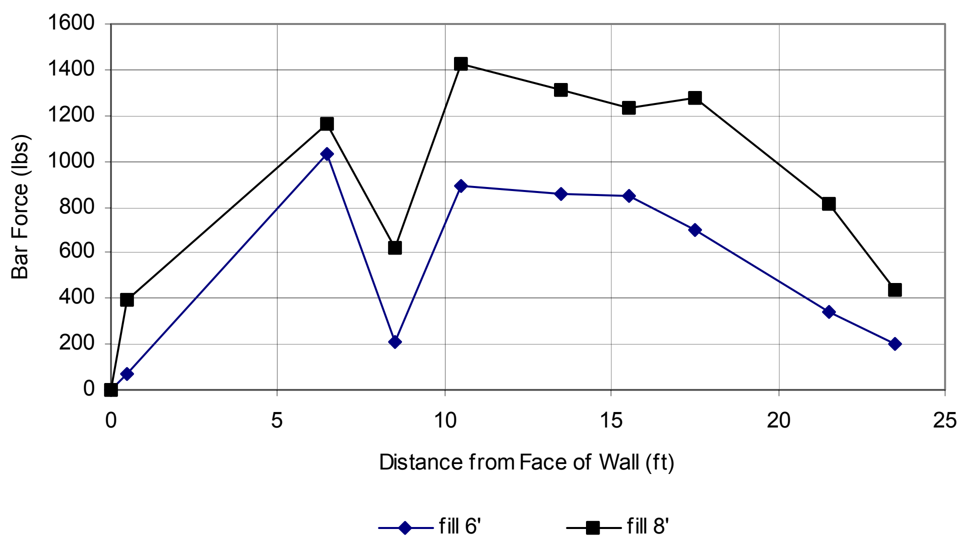

Figure D14. Measured bar forces on mat PL7 plotted with distance from fascia bar mat wall face.

No useable data for IL1.5.

Figure D15. Measured bar forces on mat IL1.5 plotted with distance from fascia bar mat wall face.

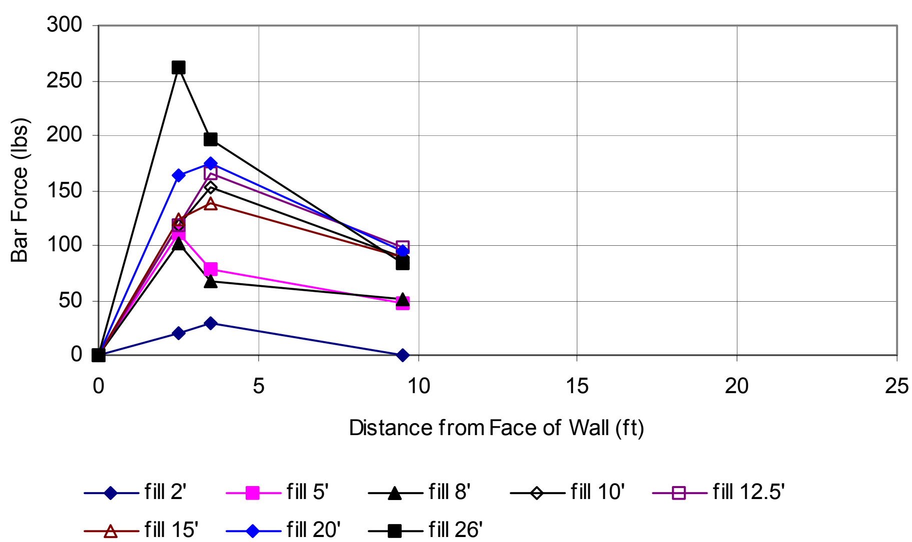

Figure D16. Measured bar forces on mat IL2.5 plotted with distance from fascia bar mat wall face.

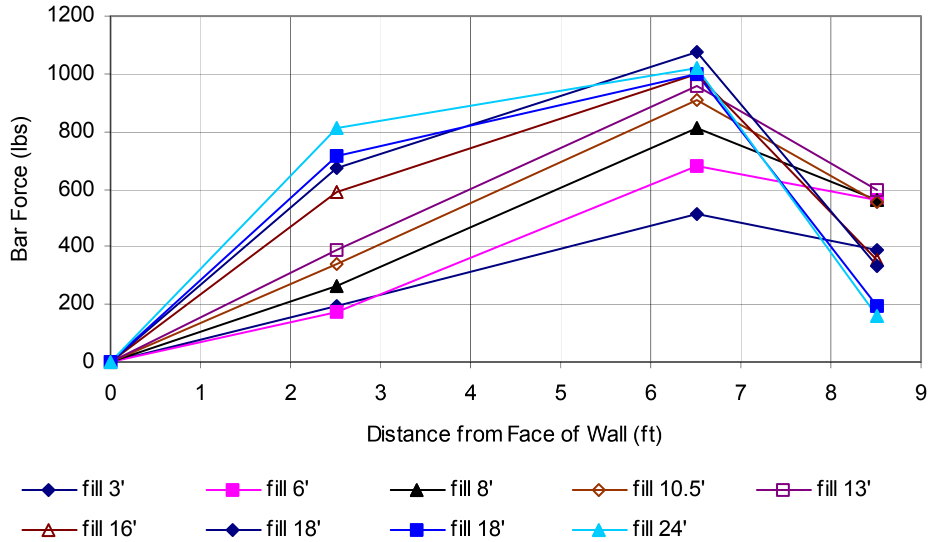

Figure D17. Measured bar forces on mat IL3.5 plotted with distance from fascia bar mat wall face.

Appendix E

Table E1. Tabulated data for primary bar mat IL1 located in the intermediate and primary reinforced section (full bridge data).

	Left Bar Mat					
	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	LI1_3 3	LI1_5 5	LI1_9 9	LI1_13 13	LI1_19 19	LI1_23 23
0.00	0.000	Bad Gage	0.000	0.000	Bad Gage	Bad Gage
2.00	Bad Gage	Bad Gage	45578.723	-1880.851	Bad Gage	Bad Gage
2.00	Bad Gage	Bad Gage	45011.348	-1880.851	Bad Gage	Bad Gage
3.00	21763.121	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage
4.00	Bad Gage	Bad Gage	46451.064	Bad Gage	Bad Gage	Bad Gage
5.00	Bad Gage	Bad Gage	47578.723	-15835.461	Bad Gage	Bad Gage
8.50	Bad Gage	Bad Gage	Bad Gage	-14421.277	Bad Gage	Bad Gage
10.00	Bad Gage	Bad Gage	37557.447	Bad Gage	Bad Gage	Bad Gage
12.50	31832.624	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage
15.00	Bad Gage	Bad Gage	5106.383	Bad Gage	Bad Gage	Bad Gage
18.00	Bad Gage	Bad Gage	5455.319	Bad Gage	Bad Gage	Bad Gage
20.00	35563.121	Bad Gage	5909.220	Bad Gage	Bad Gage	Bad Gage
22.50	Bad Gage	Bad Gage	6090.780	Bad Gage	Bad Gage	Bad Gage
25.00	Bad Gage	Bad Gage	6217.021	-30170.213	Bad Gage	Bad Gage
27.50	Bad Gage	Bad Gage	6702.128	-30709.22	Bad Gage	Bad Gage
28.00	Bad Gage	Bad Gage	6899.291	-28255.32	Bad Gage	Bad Gage
30.00	36258.156	Bad Gage	7187.234	Bad Gage	Bad Gage	Bad Gage
30.10	40215.603	Bad Gage	7178.723	Bad Gage	Bad Gage	Bad Gage
36.10	Bad Gage	Bad Gage	7302.128	Bad Gage	Bad Gage	Bad Gage
36.20	Bad Gage	Bad Gage	7374.468	Bad Gage	Bad Gage	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Table E1. Tabulated data for primary bar mat IL1 located in the intermediate and primary reinforced section (full bridge data). (Continued).

Right Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)							
	RI1_1	RI1_3	RI1_5	RI1_7	RI1_11	RI1_15	RI1_17	RI1_21
	1	3	5	7	11	15	17	21
0.00	0.000	Bad Gage	0.000	Bad Gage	0.000	0.000	0.000	0.000
2.00	-19.858	Bad Gage	7.092	Bad Gage	-3821.277	524.823	59.574	143.262
2.00	-19.858	Bad Gage	5.674	Bad Gage	-3821.277	524.823	59.574	143.262
3.00	-2.837	Bad Gage	31.206	Bad Gage	-2582.979	851.064	582.979	537.589
4.00	Bad Gage	Bad Gage	39.716	Bad Gage	-5536.170	1076.596	944.681	463.830
5.00	Bad Gage	Bad Gage	73.759	Bad Gage	-4689.362	1012.766	1923.404	554.610
8.50	-2326.241	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage
10.00	Bad Gage	Bad Gage	295.035	Bad Gage	-4625.532	1127.660	2385.816	504.965
12.50	Bad Gage	Bad Gage	418.440	Bad Gage	-5438.298	1219.858	2706.383	448.227
15.00	Bad Gage	Bad Gage	533.333	Bad Gage	-5736.170	1310.638	2869.504	426.950
18.00	Bad Gage	Bad Gage	541.844	Bad Gage	-5412.766	1374.468	2957.447	395.745
20.00	Bad Gage	Bad Gage	631.206	Bad Gage	-5618.440	1476.596	3052.482	405.674
22.50	Bad Gage	Bad Gage	699.291	Bad Gage	-5438.298	1557.447	3127.660	405.674
25.00	Bad Gage	Bad Gage	724.823	Bad Gage	-5893.617	1607.092	3161.702	394.326
27.50	Bad Gage	Bad Gage	771.631	Bad Gage	-6072.340	1740.426	3302.128	350.355
28.00	Bad Gage	Bad Gage	841.135	Bad Gage	-6153.191	1782.979	3300.709	397.163
30.00	Bad Gage	Bad Gage	835.461	Bad Gage	-6034.043	1934.752	3421.277	388.652
30.10	Bad Gage	Bad Gage	787.234	Bad Gage	-5568.794	2093.617	3536.170	363.121
36.10	Bad Gage	Bad Gage	631.206	Bad Gage	-6187.234	2649.645	3635.461	361.702
36.20	Bad Gage	Bad Gage	295.035	Bad Gage	-5834.043	2574.468	4187.234	-302.128
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-7442.553	3285.106	7231.206	-9775.887

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E2. Tabulated data for primary bar mat IL1 located in the intermediate and primary reinforced section (half bridge bottom data).

	Left Bar Mat					
	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	LI1_3B 3	LI1_5B 5	LI1_9B 9	LI1_13B 13	LI1_19B 19	LI1_23B 23
3.00	0.000	Bad Gage	0.000	Bad Gage	0.000	0.000
4.00	Bad Gage	Bad Gage	57.820	Bad Gage	-72.275	0.000
5.00	Bad Gage	Bad Gage	14.455	Bad Gage	598.439	2.891
8.50	Bad Gage	Bad Gage	14.455	Bad Gage	858.630	28.910
10.00	Bad Gage	Bad Gage	49.147	Bad Gage	1017.635	28.910
12.50	20583.98	Bad Gage	66.493	Bad Gage	1509.107	-14.455
15.00	Bad Gage	Bad Gage	153.223	Bad Gage	1899.393	-11.564
18.00	Bad Gage	Bad Gage	132.986	Bad Gage	2003.469	Bad Gage
20.00	27117.664	Bad Gage	159.005	Bad Gage	2356.172	-28.910
22.50	Bad Gage	Bad Gage	170.570	Bad Gage	2679.965	-23.128
25.00	Bad Gage	Bad Gage	147.441	Bad Gage	2784.042	-5.782
27.50	20844.175	Bad Gage	57.820	Bad Gage	3191.674	20.237
28.00	12041.052	Bad Gage	127.204	Bad Gage	3521.249	26.019
30.00	Bad Gage	Bad Gage	213.935	Bad Gage	4119.688	98.294
30.10	Bad Gage	Bad Gage	132.986	Bad Gage	5134.432	106.967
36.10	Bad Gage	Bad Gage	-254.409	Bad Gage	6689.795	167.679
36.20	Bad Gage	Bad Gage	-453.888	Bad Gage	7233.304	237.063
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Table E2. Tabulated data for primary bar mat IL1 located in the intermediate and primary reinforced section (half bridge bottom data). (Continued).

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat IL1 (ft)	RI1_1B 1	RI1_3B 3	RI1_5B 5	RI1_7B 7	RI1_11B 11	RI1_15B 15	RI1_17B 17	RI1_21B 21
3.00	0.000	Bad Gage	0.000	0.000	Bad Gage	0.000	0.000	0.000
4.00	78.057	Bad Gage	-8.673	-98.294	Bad Gage	75.166	508.818	329.575
5.00	-95.403	Bad Gage	86.730	300.665	Bad Gage	52.038	2139.347	300.665
8.50	8.673	Bad Gage	211.044	370.049	Bad Gage	179.243	2546.979	381.613
10.00	26.019	Bad Gage	329.575	474.125	Bad Gage	199.480	2737.785	407.632
12.50	112.749	Bad Gage	450.997	656.259	Bad Gage	303.556	3194.565	511.709
15.00	164.788	Bad Gage	555.074	812.374	Bad Gage	390.286	3425.846	589.766
18.00	208.153	Bad Gage	581.093	847.066	Bad Gage	433.651	3333.333	641.804
20.00	225.499	Bad Gage	633.131	948.251	Bad Gage	494.363	3691.818	644.695
22.50	312.229	Bad Gage	711.188	1029.199	Bad Gage	563.747	3813.241	685.169
25.00	424.978	Bad Gage	731.425	1029.199	Bad Gage	589.766	3865.279	627.349
27.50	849.957	Bad Gage	745.880	1052.327	Bad Gage	685.169	4058.977	766.117
28.00	988.725	Bad Gage	806.592	1159.295	Bad Gage	702.515	4116.797	780.572
30.00	1387.684	Bad Gage	780.572	1208.442	Bad Gage	832.611	4220.873	867.303
30.10	1506.216	Bad Gage	823.938	1315.409	Bad Gage	936.687	4420.353	875.976
36.10	3281.295	Bad Gage	566.638	1960.104	Bad Gage	638.913	4252.674	899.104
36.20	2176.930	Bad Gage	-242.845	1260.480	Bad Gage	1300.954	4429.026	789.245
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	25432.21	Bad Gage	Bad Gage

Table E3. Tabulated data for primary bar mat IL1 located in the intermediate and primary reinforced section (half bridge top data).

	Left Bar Mat					
	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	LI1_3T 3	LI1_5T 5	LI1_9T 9	LI1_13T 13	LI1_19T 19	LI1_23T 23
3.00	0.000	Bad Gage	Bad Gage	0.000	0.000	0.000
4.00	69.384	Bad Gage	Bad Gage	112.749	Bad Gage	Bad Gage
5.00	503.036	Bad Gage	Bad Gage	63.602	Bad Gage	-76157.849
8.50	612.894	Bad Gage	Bad Gage	416.305	Bad Gage	Bad Gage
10.00	682.278	Bad Gage	Bad Gage	424.978	Bad Gage	Bad Gage
12.50	797.918	Bad Gage	Bad Gage	534.837	Bad Gage	Bad Gage
15.00	719.861	Bad Gage	Bad Gage	604.221	Bad Gage	Bad Gage
18.00	771.899	Bad Gage	Bad Gage	612.894	Bad Gage	Bad Gage
20.00	763.226	Bad Gage	Bad Gage	598.439	Bad Gage	Bad Gage
22.50	806.592	Bad Gage	Bad Gage	563.747	Bad Gage	Bad Gage
25.00	797.918	Bad Gage	Bad Gage	650.477	Bad Gage	Bad Gage
27.50	693.842	Bad Gage	Bad Gage	728.534	Bad Gage	Bad Gage
28.00	803.700	Bad Gage	Bad Gage	615.785	Bad Gage	-37597.572
30.00	719.861	Bad Gage	Bad Gage	702.515	Bad Gage	Bad Gage
30.10	1107.256	Bad Gage	Bad Gage	211.044	Bad Gage	Bad Gage
36.10	1405.030	Bad Gage	Bad Gage	352.703	Bad Gage	Bad Gage
36.20	1673.894	Bad Gage	Bad Gage	1277.826	Bad Gage	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Table E3. Tabulated data for primary bar mat IL1 located in the intermediate and primary reinforced section (half bridge top data). (Continued).

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat IL1 (ft)	RI1_1T 1	RI1_3T 3	RI1_5T 5	RI1_7T 7	RI1_11T 11	RI1_15T 15	RI1_17T 17	RI1_21T 21
3.00	0.000	0.000	0.000	Bad Gage	Bad Gage	0.000	0.000	0.000
4.00	Bad Gage	-219.717	-17.346	Bad Gage	Bad Gage	32665.510	352.703	-5047.702
5.00	Bad Gage	-309.338	-34.692	Bad Gage	Bad Gage	32425.557	792.136	-5342.585
8.50	Bad Gage	-390.286	-130.095	Bad Gage	Bad Gage	32552.761	968.488	-5281.873
10.00	Bad Gage	-439.433	-242.845	Bad Gage	Bad Gage	32578.780	1075.455	-5287.655
12.50	Bad Gage	-520.382	-370.049	Bad Gage	Bad Gage	32639.491	1274.935	-5290.546
15.00	Bad Gage	-664.932	-485.690	Bad Gage	Bad Gage	32769.587	1370.338	-5325.239
18.00	Bad Gage	-754.553	-482.798	Bad Gage	Bad Gage	32838.971	1431.049	-5307.892
20.00	Bad Gage	-1179.532	-592.657	Bad Gage	Bad Gage	32951.720	1474.415	-5368.604
22.50	Bad Gage	-1465.742	-702.515	Bad Gage	Bad Gage	33081.816	1491.761	-5403.296
25.00	Bad Gage	-1699.913	-702.515	Bad Gage	Bad Gage	33162.764	1509.107	-5368.604
27.50	Bad Gage	-2110.437	-737.207	Bad Gage	Bad Gage	33324.66	1578.491	-5359.931
28.00	Bad Gage	-2370.627	-823.938	Bad Gage	Bad Gage	33394.04	1578.491	-5455.334
30.00	Bad Gage	-3087.598	-771.899	Bad Gage	Bad Gage	33605.09	1621.856	-5446.661
30.10	Bad Gage	-3408.500	-682.278	Bad Gage	Bad Gage	33758.312	1734.605	-5507.372
36.10	9436.253	-3810.350	-769.008	Bad Gage	Bad Gage	33651.344	2844.753	-6449.841
36.20	10170.570	-4605.377	Bad Gage	Bad Gage	Bad Gage	34079.214	3243.712	-6039.318
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	52023.706	45637.467	25915.004

Table E4. Tabulated data for primary bar mat PL1 located in the primary reinforced only section (full bridge data).

Left Bar Mat

Height of fill above bar mat PL1 (ft)	Measured Bar Force (lb)					
	LP1_3 3	LP1_5 5	LP1_9 9	LP1_13 13	LP1_19 19	LP1_23 23
0.00	Bad Gage	0.000	0.000	0.000	Bad Gage	Bad Gage
2.00	Bad Gage	9.93E+06	48.227	97.872	Bad Gage	Bad Gage
2.00	Bad Gage	-11622.695	46.809	96.454	Bad Gage	Bad Gage
3.00	Bad Gage	Bad Gage	314.894	208.511	Bad Gage	Bad Gage
4.00	Bad Gage	Bad Gage	378.723	278.014	Bad Gage	Bad Gage
5.00	Bad Gage	Bad Gage	446.809	387.234	Bad Gage	Bad Gage
8.50	Bad Gage	Bad Gage	493.617	459.574	Bad Gage	Bad Gage
10.00	Bad Gage	Bad Gage	510.638	451.064	Bad Gage	Bad Gage
12.50	Bad Gage	Bad Gage	587.234	504.965	Bad Gage	Bad Gage
15.00	Bad Gage	Bad Gage	587.234	502.128	Bad Gage	Bad Gage
18.00	Bad Gage	Bad Gage	659.574	533.333	Bad Gage	Bad Gage
20.00	Bad Gage	Bad Gage	727.660	600.000	Bad Gage	Bad Gage
22.50	Bad Gage	Bad Gage	770.213	597.163	Bad Gage	Bad Gage
25.00	Bad Gage	Bad Gage	829.787	621.277	Bad Gage	Bad Gage
27.50	Bad Gage	Bad Gage	927.660	713.475	Bad Gage	Bad Gage
28.00	Bad Gage	Bad Gage	944.681	685.106	Bad Gage	Bad Gage
30.00	Bad Gage	Bad Gage	1102.128	800.000	Bad Gage	Bad Gage
36.10	Bad Gage	Bad Gage	1730.496	1229.787	Bad Gage	Bad Gage
36.20	Bad Gage	Bad Gage	1960.284	1395.745	Bad Gage	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	24022.70	Bad Gage	Bad Gage

Right Bar Mat

Height of fill above bar mat PL1 (ft)	Measured Bar Force (lb)							
	RP1_1 1	RP1_3 3	RP1_5 5	RP1_7 7	RP1_11 11	RP1_15 15	RP1_17 17	RP1_21 21
0.00	0.000	0.000	Bad Gage	0.000	Bad Gage	0.000	0.000	Bad Gage
2.00	-42.553	232.624	Bad Gage	-24.113	Bad Gage	353.191	212.766	Bad Gage
2.00	-42.553	234.043	Bad Gage	-24.113	Bad Gage	353.191	212.766	Bad Gage
3.00	-85.106	234.043	Bad Gage	341.844	Bad Gage	468.085	719.149	Bad Gage
4.00	-63.830	234.043	Bad Gage	367.376	Bad Gage	497.872	757.447	Bad Gage
5.00	-42.553	242.553	Bad Gage	380.142	Bad Gage	591.489	1068.085	Bad Gage
8.50	2.837	204.255	Bad Gage	337.589	Bad Gage	676.596	1079.433	Bad Gage
10.00	0.000	170.213	Bad Gage	273.759	Bad Gage	702.128	1097.872	Bad Gage
12.50	109.220	234.043	Bad Gage	197.163	Bad Gage	821.277	1110.638	Bad Gage
15.00	106.383	221.277	Bad Gage	197.163	Bad Gage	822.695	1110.638	Bad Gage
18.00	-116.312	347.518	Bad Gage	3503.546	Bad Gage	906.383	1092.199	Bad Gage
20.00	275.177	234.043	Bad Gage	-2.837	Bad Gage	947.518	1100.709	Bad Gage
22.50	266.667	242.553	Bad Gage	-144.681	Bad Gage	953.191	1080.851	Bad Gage
25.00	246.809	276.596	Bad Gage	-83.688	Bad Gage	1008.511	1053.901	Bad Gage
27.50	296.454	302.128	Bad Gage	-130.496	Bad Gage	1072.340	1000.000	Bad Gage
28.00	296.454	263.830	Bad Gage	-377.305	Bad Gage	1063.830	1042.553	Bad Gage
30.00	317.730	279.433	Bad Gage	-930.496	Bad Gage	1187.234	954.610	Bad Gage
36.10	160.284	676.596	Bad Gage	-1124.823	Bad Gage	1361.702	-302.128	Bad Gage
36.20	1045.390	1045.390	Bad Gage	-1529.078	Bad Gage	1483.688	-597.163	Bad Gage
Final Grade	12744.681	12595.745	Bad Gage	Bad Gage	Bad Gage	2093.617	Bad Gage	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E5. Tabulated data for primary bar mat PL1 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL1 (ft)	LP1_3B 3	LP1_5B 5	LP1_9B 9	LP1_13B 13	LP1_19B 19	LP1_23B 23
3.00	0.000	0.000	0.000	0.000	0.000	Bad Gage
4.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-867.303	Bad Gage
5.00	-193.698	-182.134	86.730	104.076	338.248	Bad Gage
8.50	-277.537	-156.114	130.095	416.305	329.575	Bad Gage
10.00	-315.120	-260.191	104.076	396.068	381.613	Bad Gage
12.50	-289.101	-398.959	112.749	355.594	485.690	Bad Gage
18.00	-219.717	-511.709	112.749	390.286	520.382	Bad Gage
20.00	-138.768	-563.747	112.749	456.779	633.131	Bad Gage
22.50	-75.166	-615.785	101.185	485.690	589.766	Bad Gage
25.00	-361.376	-572.420	190.807	563.747	581.093	Bad Gage
27.50	-760.335	-569.529	268.864	581.093	641.804	Bad Gage
28.00	-922.232	-636.022	213.935	578.202	653.368	Bad Gage
30.00	-1332.755	-557.965	355.594	656.259	821.047	Bad Gage
36.10	-1812.663	-176.352	699.624	552.183	977.161	Bad Gage
36.20	-1989.014	199.480	1046.545	835.502	1165.077	Bad Gage
Final Grade	-47967.62	Bad Gage	37953.166	72341.717	30349.812	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP1_1B 1	RP1_3B 3	RP1_5B 5	RP1_7B 7	RP1_11B 11	RP1_15B 15	RP1_17B 17	RP1_21B 21
3.00	0.000	0.000	Bad Gage	0.000	0.000	0.000	0.000	Bad Gage
4.00	797.918	-89.621	Bad Gage	-141.659	80725.643	144.550	-135.877	Bad Gage
5.00	1214.224	-459.670	Bad Gage	-167.679	76244.579	63.602	-699.624	Bad Gage
8.50	1373.229	-546.401	Bad Gage	-193.698	Bad Gage	254.409	-829.720	Bad Gage
10.00	1451.286	-598.439	Bad Gage	-135.877	56568.372	263.082	-881.758	Bad Gage
12.50	1948.540	-676.496	Bad Gage	-72.275	5845.620	349.812	-942.469	Bad Gage
18.00	2584.562	-6866.146	Bad Gage	9632.842	-12257.878	427.869	-956.924	Bad Gage
20.00	3243.712	-205.262	Bad Gage	109.858	-20858.63	436.542	-1061.000	Bad Gage
22.50	3524.140	-147.441	Bad Gage	291.992	Bad Gage	488.581	-1072.564	Bad Gage
25.00	3628.216	-8.673	Bad Gage	138.768	Bad Gage	557.965	-1063.891	Bad Gage
27.50	3642.671	320.902	Bad Gage	101.185	Bad Gage	583.984	-1003.180	Bad Gage
28.00	3498.121	468.343	Bad Gage	144.550	Bad Gage	578.202	-1055.218	Bad Gage
30.00	3029.777	812.374	Bad Gage	179.243	Bad Gage	696.733	-1017.635	Bad Gage
36.10	1717.259	323.793	Bad Gage	806.592	Bad Gage	1318.300	-734.316	Bad Gage
36.20	835.502	555.074	Bad Gage	618.676	Bad Gage	1208.442	-719.861	Bad Gage
Final Grade	-16178.086	14842.440	Bad Gage	Bad Gage	Bad Gage	11318.300	-32772.48	Bad Gage

Table E6. Tabulated data for primary bar mat PL1 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL1 (ft)	LP1_3T 3	LP1_5T 5	LP1_9T 9	LP1_13T 13	LP1_19T 19	LP1_23T 23
3.00	Bad Gage	0.000	0.000	0.000	Bad Gage	0.000
4.00	Bad Gage	Bad Gage	52.038	147.441	Bad Gage	-71153.513
5.00	Bad Gage	Bad Gage	138.768	-95.403	Bad Gage	Bad Gage
8.50	Bad Gage	Bad Gage	208.153	138.768	Bad Gage	Bad Gage
10.00	Bad Gage	Bad Gage	242.845	130.095	Bad Gage	Bad Gage
18.00	Bad Gage	Bad Gage	537.728	52.038	Bad Gage	4385.661
20.00	Bad Gage	Bad Gage	659.150	109.858	Bad Gage	1292.281
22.50	Bad Gage	Bad Gage	737.207	150.332	Bad Gage	1422.376
25.00	Bad Gage	Bad Gage	797.918	216.826	Bad Gage	1462.851
27.50	Bad Gage	Bad Gage	936.687	294.883	Bad Gage	1578.491
28.00	Bad Gage	Bad Gage	1006.071	225.499	Bad Gage	1673.894
30.00	Bad Gage	Bad Gage	1205.551	407.632	Bad Gage	1864.701
36.10	Bad Gage	Bad Gage	2081.526	581.093	Bad Gage	2419.775
36.20	Bad Gage	Bad Gage	2393.755	815.265	Bad Gage	2778.260
Final Grade	Bad Gage	Bad Gage	Bad Gage	18343.452	Bad Gage	26533.68

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP1_1T 1	RP1_3T 3	RP1_5T 5	RP1_7T 7	RP1_11T 11	RP1_15T 15	RP1_17T 17	RP1_21T 21
3.00	0.000	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
4.00	-789.245	101.185	-52.038	26.019	Bad Gage	-26.019	75.166	225.499
5.00	-1286.499	398.959	-468.343	115.640	Bad Gage	95.403	106.967	581.093
8.50	-1552.472	468.343	-537.728	104.076	Bad Gage	237.063	144.550	884.649
10.00	-1595.837	459.670	-537.728	173.461	Bad Gage	257.300	170.570	962.706
18.00	-3090.489	-581.093	176.352	3876.843	Bad Gage	427.869	361.376	1485.979
20.00	-3920.208	563.747	-716.970	563.747	Bad Gage	488.581	370.049	1630.529
22.50	-4137.034	147.441	-763.226	633.131	Bad Gage	523.273	370.049	1743.278
25.00	-4316.276	0.000	-789.245	650.477	Bad Gage	572.420	396.068	1824.227
27.50	-4350.968	-364.267	-858.630	728.534	Bad Gage	633.131	465.452	1928.303
28.00	-4206.418	-468.343	-884.649	1118.820	Bad Gage	624.458	433.651	1962.995
30.00	-3868.170	-806.592	-1006.071	2315.698	Bad Gage	722.752	560.856	2176.930
36.10	-2416.883	-766.117	-1335.646	3778.549	Bad Gage	682.278	2758.023	2211.622
36.20	-1474.415	-485.690	-1393.466	3781.440	Bad Gage	1231.570	-185.025	2836.080
Final Grade	-16221.451	10844.175	-9684.880	-18490.89	Bad Gage	24183.290	Bad Gage	49551.894

Table E7. Tabulated data for primary bar mat IL2 located in the intermediate and primary reinforced section (full bridge data).

Left Bar Mat							
	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI2_1 1	LI2_5 5	LI2_7 7	LI2_9 9	LI2_11 11	LI2_15 15	LI2_19 19
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5.00	Bad Gage	1493.617	86.525	106.383	97.872	178.723	309.220
8.50	-1639.716	Bad Gage	1648.227	Bad Gage	225.532	365.957	489.362
8.50	-1659.574	Bad Gage	1648.227	Bad Gage	225.532	365.957	353.191
10.00	3157.447	Bad Gage	1971.631	Bad Gage	336.170	293.617	29.787
12.50	3021.277	Bad Gage	2095.035	Bad Gage	259.574	249.645	2770.213
15.00	Bad Gage	Bad Gage	2180.142	Bad Gage	336.170	238.298	2734.752
18.00	Bad Gage	Bad Gage	2248.227	Bad Gage	387.234	285.106	Bad Gage
20.00	Bad Gage	Bad Gage	2300.709	Bad Gage	408.511	255.319	1207.092
22.50	Bad Gage	Bad Gage	2368.794	Bad Gage	438.298	234.043	706.383
25.00	Bad Gage	Bad Gage	2422.695	Bad Gage	527.660	246.809	154.610
27.50	Bad Gage	Bad Gage	2456.738	Bad Gage	893.617	221.277	65.957
28.00	Bad Gage	Bad Gage	2475.177	Bad Gage	614.184	170.213	926.241
30.00	Bad Gage	Bad Gage	2533.333	Bad Gage	Bad Gage	136.170	449.645
30.10	Bad Gage	Bad Gage	2588.652	Bad Gage	Bad Gage	97.872	141.844
36.10	Bad Gage	Bad Gage	2492.199	Bad Gage	Bad Gage	151.773	-18.440
36.10	Bad Gage	Bad Gage	2492.199	Bad Gage	Bad Gage	151.773	-26.950
36.20	Bad Gage	Bad Gage	2592.908	Bad Gage	Bad Gage	1424.113	Bad Gage
Final Grade	Bad Gage	Bad Gage	4178.723	Bad Gage	3137.589	Bad Gage	Bad Gage
Final Grade	Bad Gage	Bad Gage	4591.489	Bad Gage	3126.241	Bad Gage	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E7. Tabulated data for primary bar mat IL2 located in the intermediate and primary reinforced section (full bridge data). (Continued).

	Right Bar Mat					
	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	RI2_3 3	RI1_5 5	RI1_7 7	RI2_13 13	RI2_17 17	RI1_23 23
0.00	0.000	Bad Gage	Bad Gage	0.000	0.000	Bad Gage
5.00	-15607.09	Bad Gage	Bad Gage	Bad Gage	97.872	Bad Gage
8.50	-10075.18	Bad Gage	Bad Gage	Bad Gage	404.255	Bad Gage
8.50	-10100.71	Bad Gage	Bad Gage	Bad Gage	404.255	Bad Gage
10.00	-17553.19	Bad Gage	Bad Gage	Bad Gage	676.596	Bad Gage
12.50	-18704.96	Bad Gage	Bad Gage	Bad Gage	612.766	Bad Gage
15.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	561.702	Bad Gage
18.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	570.213	Bad Gage
20.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	503.546	Bad Gage
22.50	Bad Gage	Bad Gage	Bad Gage	Bad Gage	459.574	Bad Gage
25.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	425.532	Bad Gage
27.50	Bad Gage	Bad Gage	Bad Gage	Bad Gage	384.397	Bad Gage
28.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	340.426	Bad Gage
30.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	285.106	Bad Gage
30.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	276.596	Bad Gage
36.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	302.128	Bad Gage
36.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	302.128	Bad Gage
36.20	Bad Gage	Bad Gage	Bad Gage	Bad Gage	459.574	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	4048.227	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	4053.901	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E8. Tabulated data for primary bar mat IL2 located in the intermediate and primary reinforced section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI2_1B 1	LI2_5B 5	LI2_7B 7	LI2_9B 9	LI2_11B 11	LI2_15B 15	LI2_19B 19
0.00	0.000	Bad Gage	0.000	0.000	0.000	0.000	Bad Gage
5.00	Bad Gage	Bad Gage	598.439	-1081.237	1630.529	-72.275	Bad Gage
8.50	-7016.479	Bad Gage	2601.908	-1069.673	2948.829	1058.109	Bad Gage
10.00	3104.944	Bad Gage	2891.009	-991.616	3044.232	1006.071	Bad Gage
12.50	2723.330	Bad Gage	2922.810	-1468.633	2992.194	893.322	Bad Gage
15.00	2827.407	Bad Gage	2914.137	-1644.984	2966.175	823.938	Bad Gage
18.00	3078.925	Bad Gage	2931.483	-1676.785	3009.540	841.284	Bad Gage
20.00	2888.118	Bad Gage	2931.483	-1867.592	2966.175	797.918	Bad Gage
22.50	Bad Gage	Bad Gage	2922.810	-1980.341	2940.156	728.534	Bad Gage
25.00	Bad Gage	Bad Gage	2969.066	-1962.995	2914.137	760.335	Bad Gage
27.50	98725.065	Bad Gage	3023.995	-2067.071	2867.881	696.733	Bad Gage
28.00	86149.176	Bad Gage	2966.175	-2171.148	2827.407	598.439	Bad Gage
30.00	Bad Gage	Bad Gage	2957.502	-2205.840	2740.676	563.747	Bad Gage
30.10	100719.86	Bad Gage	2888.118	-2466.031	2778.260	450.997	Bad Gage
36.10	92393.755	Bad Gage	3174.328	-823.938	2853.426	572.420	Bad Gage
36.20	Bad Gage	Bad Gage	3009.540	-3368.025	3000.867	2801.388	Bad Gage
Final Grade	45738.653	Bad Gage	20951.142	Bad Gage	35828.274	Bad Gage	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	RI2_3B 3	RI1_5B 5	RI1_7B 7	RI2_13B 13	RI2_17B 17	RI1_23B 23
0.00	0.000	Bad Gage	Bad Gage	0.000	Bad Gage	0.000
5.00	-38094.83	Bad Gage	Bad Gage	572.420	Bad Gage	1208.442
8.50	-36750.51	Bad Gage	Bad Gage	4041.631	Bad Gage	-2552.761
10.00	-36646.43	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2648.164
12.50	-37056.95	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2448.685
15.00	-38242.27	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2387.973
18.00	-38106.39	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2466.031
20.00	-38349.23	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2518.069
22.50	-38701.94	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2604.799
25.00	-38860.94	Bad Gage	Bad Gage	22599.017	Bad Gage	-2604.799
27.50	-39476.73	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2708.875
28.00	-39728.25	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2786.933
30.00	-40222.61	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-2925.701
30.10	-40396.07	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-3116.508
36.10	-41058.11	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-3402.718
36.20	-41321.19	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage
Final Grade	-33142.53	Bad Gage	Bad Gage	245.736	Bad Gage	Bad Gage

Table E9. Tabulated data for primary bar mat IL2 located in the intermediate and primary reinforced section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI2_1T 1	LI2_5T 5	LI2_7T 7	LI2_9T 9	LI2_11T 11	LI2_15T 15	LI2_19T 19
0.00	0.000	0.000	0.000	0.000	0.000	0.000	Bad Gage
5.00	338.248	1387.684	1578.491	1127.493	-1225.788	-106.967	Bad Gage
8.50	3139.636	2784.042	1084.128	Bad Gage	-2489.159	-286.210	Bad Gage
10.00	3252.385	2350.390	1405.030	Bad Gage	-2367.736	-381.613	Bad Gage
12.50	3391.154	2315.698	1642.093	Bad Gage	-2480.486	-390.286	Bad Gage
15.00	Bad Gage	2176.930	1844.464	Bad Gage	-2281.006	-355.594	Bad Gage
18.00	Bad Gage	2107.546	1951.431	Bad Gage	-2168.257	-303.556	Bad Gage
20.00	Bad Gage	1977.450	2090.199	Bad Gage	-2012.142	-303.556	Bad Gage
22.50	Bad Gage	1864.701	2197.167	Bad Gage	-1994.796	-303.556	Bad Gage
25.00	Bad Gage	1717.259	2289.679	Bad Gage	-1777.971	-277.537	Bad Gage
27.50	Bad Gage	1604.510	2387.973	Bad Gage	-1376.120	-277.537	Bad Gage
28.00	Bad Gage	1526.453	2454.467	Bad Gage	-1286.499	-309.338	Bad Gage
30.00	Bad Gage	1326.973	2581.671	Bad Gage	Bad Gage	-297.774	Bad Gage
30.10	Bad Gage	1248.916	2645.273	Bad Gage	Bad Gage	-329.575	Bad Gage
36.10	Bad Gage	913.559	2023.706	Bad Gage	Bad Gage	-320.902	Bad Gage
36.20	Bad Gage	557.965	2899.682	Bad Gage	2642.382	-260.191	Bad Gage
Final Grade	Bad Gage	Bad Gage	10037.583	Bad Gage	14030.066	18239.376	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	RI2_3T 3	RI2_5T 5	RI2__7T 7	RI2_13T 13	RI3_17 17	RI2_23T 23
0.00	0.000	0.000	0.000	0.000	Bad Gage	0.000
5.00	-450.997	1003.180	-1289.390	Bad Gage	Bad Gage	-424.978
8.50	16131.830	Bad Gage	-1101.474	Bad Gage	Bad Gage	Bad Gage
10.00	1130.385	Bad Gage	-815.265	Bad Gage	Bad Gage	Bad Gage
12.50	-771.899	Bad Gage	-702.515	Bad Gage	Bad Gage	Bad Gage
15.00	Bad Gage	Bad Gage	-641.804	Bad Gage	Bad Gage	-68366.58
18.00	Bad Gage	Bad Gage	-610.003	Bad Gage	Bad Gage	-81723.04
20.00	Bad Gage	Bad Gage	-598.439	Bad Gage	Bad Gage	-52116.22
22.50	Bad Gage	Bad Gage	-555.074	Bad Gage	Bad Gage	Bad Gage
25.00	Bad Gage	Bad Gage	-494.363	Bad Gage	Bad Gage	-73570.40
27.50	Bad Gage	Bad Gage	-459.670	Bad Gage	Bad Gage	-86869.04
28.00	Bad Gage	Bad Gage	-450.997	Bad Gage	Bad Gage	Bad Gage
30.00	Bad Gage	Bad Gage	-398.959	Bad Gage	Bad Gage	-65851.40
30.10	Bad Gage	Bad Gage	-398.959	Bad Gage	Bad Gage	Bad Gage
36.10	Bad Gage	Bad Gage	-329.575	Bad Gage	Bad Gage	Bad Gage
36.20	Bad Gage	Bad Gage	-398.959	Bad Gage	Bad Gage	2.02E+07
Final Grade	Bad Gage	Bad Gage	15773.345	Bad Gage	Bad Gage	-62960.39

Table E10. Tabulated data for primary bar mat PL2 located in the primary reinforced only section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP2_1 1	LP2_5 5	LP2_7 7	LP2_9 9	LP2_11 11	LP2_15 15	LP2_19 19
0.00	0.00	Bad Gage	Bad Gage	0.00	0.00	0.00	0.00
5.00	-17.02	Bad Gage	Bad Gage	80.85	-226.95	323.40	Bad Gage
8.50	136.17	Bad Gage	Bad Gage	Bad Gage	-5757.45	1136.17	1073.76
10.00	278.01	Bad Gage	Bad Gage	Bad Gage	-4910.64	1051.06	1262.41
12.50	246.81	Bad Gage	Bad Gage	Bad Gage	-6978.72	1055.32	3182.98
18.00	106.38	Bad Gage	Bad Gage	Bad Gage	-10348.94	1124.82	Bad Gage
20.00	85.11	Bad Gage	Bad Gage	Bad Gage	-12939.01	1140.43	8853.90
22.50	360.28	Bad Gage	Bad Gage	Bad Gage	-12876.60	1156.03	8310.64
25.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-12834.04	1187.23	Bad Gage
27.50	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-12822.70	1178.72	Bad Gage
28.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-12791.49	1174.47	804.26
30.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-12187.23	1212.77	326.24
36.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-10580.14	1173.05	Bad Gage
36.20	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-7683.69	1435.46	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-140.43	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL1 (ft)	RP2_3 3	RP2_5 5	RP2_7 7	RP2_13 13	RP2_17 17	RP2_23 23
0.00	0.00	0.00	0.00	Bad Gage	0.00	0.00
5.00	56.74	-161.70	578.72	Bad Gage	Bad Gage	275.18
8.50	157.45	7853.90	Bad Gage	Bad Gage	21842.55	478.01
10.00	144.68	7119.15	Bad Gage	Bad Gage	21961.70	581.56
12.50	319.15	8807.09	-28109.22	Bad Gage	21191.49	492.20
18.00	663.83	7795.74	-22421.28	Bad Gage	20387.23	479.43
20.00	817.02	8852.48	-20846.81	Bad Gage	20076.60	415.60
22.50	903.55	9100.71	-20804.26	Bad Gage	19842.55	350.35
25.00	Bad Gage	-9002.84	-20676.60	Bad Gage	19760.28	329.08
27.50	Bad Gage	-8940.43	-20889.36	Bad Gage	19564.54	249.65
28.00	Bad Gage	-8927.66	-21357.45	Bad Gage	19378.72	190.07
30.00	Bad Gage	-8835.46	-21343.26	Bad Gage	19157.45	143.26
36.10	Bad Gage	-8907.80	-21868.09	Bad Gage	17487.94	29.79
36.20	Bad Gage	-8801.42	-22548.94	Bad Gage	17585.82	36.88
10.00	Bad Gage	1948.94	Bad Gage	Bad Gage	24107.80	3266.67

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E11. Tabulated data for primary bar mat PL2 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL2 (ft)	LP2_1B 1	LP2_5B 5	LP2_7B 7	LP2_9B 9	LP2_11B 11	LP2_15B 15	LP2_19B 19
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.50	-49.15	685.17	-63469.21	95.40	-11185.31	2150.91	0.00
10.00	-17.35	1092.80	-58213.36	381.61	-9791.85	2072.85	0.00
12.50	-1257.59	1326.97	-72922.81	390.29	-14735.47	2052.62	0.00
15.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-16024.86	2038.16	271.75
18.00	-2546.98	1673.89	-81595.84	552.18	-22043.94	2133.56	595.55
20.00	-2515.18	1803.99	-88013.88	367.16	-27487.71	2150.91	60.71
22.50	-2119.11	2029.49	Bad Gage	338.25	-27502.17	2168.26	86.73
25.00	Bad Gage	2217.40	-20965.60	390.29	-27507.95	2211.62	0.00
27.50	Bad Gage	2272.33	-19731.14	260.19	-27510.84	2211.62	0.00
28.00	Bad Gage	2263.66	-19878.58	199.48	-27519.51	2176.93	66.49
30.00	81095.69	2393.76	-20416.31	164.79	-26435.39	2194.28	0.00
36.10	Bad Gage	1503.32	-21890.72	-1058.11	-23581.96	2130.67	26.02
36.20	36845.91	1621.86	-21942.76	-1488.87	Bad Gage	2107.55	43.37
Final Grade	Bad Gage	23026.89	Bad Gage	16308.18	Bad Gage	22127.78	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL2 (ft)	RP2_3B 3	RP2_5B 5	RP2_7B 7	RP2_13B 13	RP2_17B 17	RP2_23B 23
0.00	0.00	0.00	0.00	0.00	Bad Gage	0.00
8.50	-815.26	-95.40	Bad Gage	141.66	Bad Gage	867.30
10.00	-237.06	-318.01	Bad Gage	555.07	Bad Gage	962.71
12.50	419.20	-647.59	57878.00	896.21	Bad Gage	867.30
15.00	-2.89	-1063.89	49638.62	910.67	Bad Gage	728.53
18.00	-497.25	-1173.75	46400.69	930.90	Bad Gage	849.96
20.00	-930.90	-1153.51	43278.40	896.21	Bad Gage	789.25
22.50	-1324.08	-1104.37	43278.40	878.87	Bad Gage	716.97
25.00	-1477.31	-1185.31	43104.94	861.52	Bad Gage	693.84
27.50	-1884.94	-1202.66	43625.33	852.85	Bad Gage	607.11
28.00	-2095.98	-1211.33	44492.63	847.07	Bad Gage	526.16
30.00	-2379.30	-1306.74	44492.63	826.83	Bad Gage	442.32
36.10	-2856.32	1072.56	45880.31	890.43	Bad Gage	320.90
36.20	-3168.55	-2035.27	46631.97	930.90	Bad Gage	329.58
10.00	8418.62	-17363.40	Bad Gage	14989.88	Bad Gage	13269.73

Table E12. Tabulated data for primary bar mat PL2 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL2 (ft)	LP2_1T 1	LP2_5T 5	LP2_7T 7	LP2_9T 9	LP2_11T 11	LP2_15T 15	LP2_19T 19
0.00	0.00	Bad Gage	Bad Gage	0.00	0.00	0.00	0.00
8.50	320.90	Bad Gage	Bad Gage	Bad Gage	132.99	537.73	0.00
10.00	607.11	Bad Gage	Bad Gage	Bad Gage	326.68	615.78	0.00
12.50	6.07E+07	Bad Gage	Bad Gage	641.80	2069.96	26111.59	0.00
12.50	1763.52	Bad Gage	Bad Gage	Bad Gage	1150.62	618.68	0.00
15.00	468.34	Bad Gage	Bad Gage	2940.16	1422.38	598.44	196.59
18.00	2636.60	Bad Gage	Bad Gage	Bad Gage	1688.35	563.75	196.59
20.00	2775.37	Bad Gage	Bad Gage	Bad Gage	1844.46	555.07	66.49
22.50	-2914.14	Bad Gage	Bad Gage	Bad Gage	2020.82	523.27	75.17
25.00	-3026.89	Bad Gage	Bad Gage	Bad Gage	2043.94	511.71	0.00
27.50	-3018.21	Bad Gage	Bad Gage	Bad Gage	2165.37	520.38	0.00
28.00	-3000.87	Bad Gage	Bad Gage	Bad Gage	2243.42	511.71	78.06
30.00	-58106.39	Bad Gage	Bad Gage	Bad Gage	2292.57	468.34	0.00
36.10	-59343.74	Bad Gage	Bad Gage	Bad Gage	3209.02	320.90	2098.87
Final Grade	-54400.12	Bad Gage	Bad Gage	Bad Gage	6776.53	89.62	1150.62

Right Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL2 (ft)	RP2_3T 3	RP2_5T 5	RP2_7T 7	RP2_13T 13	RP2_17T 17	RP2_23T 23
0.00	0.00	0.00	0.00	Bad Gage	0.00	0.00
8.50	670.71	17533.97	216.83	Bad Gage	Bad Gage	-291.99
10.00	132.99	16180.98	138.77	Bad Gage	3576.18	-182.13
12.50	-847.07	1326.97	-5177.80	Bad Gage	-899.10	3321.77
12.50	-893.32	20280.43	338.25	Bad Gage	2888.12	-320.90
15.00	-852.85	18407.05	312.23	Bad Gage	13451.86	-294.88
18.00	-630.24	18155.54	407.63	Bad Gage	10150.33	-329.58
20.00	-534.84	20557.96	485.69	Bad Gage	-19690.66	-381.61
22.50	-404.74	21335.65	615.78	Bad Gage	Bad Gage	-410.52
25.00	Bad Gage	21196.88	685.17	Bad Gage	Bad Gage	-433.65
27.50	Bad Gage	21260.48	763.23	Bad Gage	Bad Gage	-503.04
28.00	Bad Gage	21422.38	763.23	Bad Gage	Bad Gage	-569.53
30.00	Bad Gage	21734.61	910.67	Bad Gage	Bad Gage	-607.11
36.10	Bad Gage	23847.93	1176.64	Bad Gage	Bad Gage	-667.82
10.00	Bad Gage	22275.22	1193.99	Bad Gage	Bad Gage	-731.43

Table E13. Tabulated data for primary bar mat IL3 located in the intermediate and primary reinforced section (full bridge data).

Left Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)					
	LI3_3	LI3_5	LI3_7	LI3_11	LI3_15	LI3_19
	3	5	7	11	15	19
12.00	0.000	0.000	0.000	0.000	0.000	0.000
15.00	70.922	361.702	514.894	487.943	300.709	519.149
18.00	127.660	546.099	727.660	660.993	431.206	676.596
20.00	364.539	621.277	961.702	726.241	587.234	774.468
22.50	568.794	669.504	1147.518	804.255	710.638	885.106
25.00	585.816	734.752	1251.064	848.227	744.681	944.681
27.50	802.837	743.262	1336.170	800.000	727.660	931.915
28.00	930.496	706.383	1391.489	774.468	673.759	927.660
30.00	1049.645	744.681	1543.262	774.468	795.745	940.426
30.10	1143.262	697.872	1574.468	731.915	744.681	923.404
36.10	1090.780	818.440	1743.262	756.028	689.362	978.723
36.20	1133.333	1004.255	1768.794	790.071	551.773	1143.262
Final Grade	-303.546	13798.582	21731.915	Bad Gage	791.489	27438.30

Right Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)						
	RI3_1	RI3_5	RI3_7	RI3_9	RI3_13	RI3_17	RI3_23
	1	5	7	9	13	17	23
12.00	Bad Gage	Bad Gage	Bad Gage	0.000	0.000	0.000	0.000
15.00	Bad Gage	Bad Gage	Bad Gage	414.184	502.128	209.929	-153.191
18.00	Bad Gage	Bad Gage	Bad Gage	563.121	678.014	293.617	-89.362
20.00	Bad Gage	Bad Gage	Bad Gage	587.234	761.702	289.362	-102.128
22.50	Bad Gage	Bad Gage	Bad Gage	609.929	863.830	310.638	-51.064
25.00	Bad Gage	Bad Gage	Bad Gage	652.482	919.149	348.936	-8.511
27.50	Bad Gage	Bad Gage	Bad Gage	575.887	889.362	255.319	-17.021
28.00	Bad Gage	Bad Gage	Bad Gage	496.454	880.851	161.702	-21.277
30.00	Bad Gage	Bad Gage	Bad Gage	448.227	885.106	45.390	25.532
30.10	Bad Gage	Bad Gage	Bad Gage	310.638	862.411	-59.574	42.553
36.10	Bad Gage	Bad Gage	Bad Gage	232.624	808.511	-154.610	136.170
36.20	Bad Gage	Bad Gage	Bad Gage	873.759	419.858	-120.567	263.830
Final Grade	Bad Gage	Bad Gage	Bad Gage	-2465.248	Bad Gage	-1008.511	724.823

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E14. Tabulated data for primary bar mat IL3 located in the intermediate and primary reinforced section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	LI3_3B 3	LI3_5B 5	LI3_7B 7	LI3_11B 11	LI3_15B 15	LI3_19B 19
10.00	0.000	0.000	0.000	0.000	0.000	0.000
12.00	-8430.182	-2012.142	2272.333	-1324.082	1529.344	1454.178
15.00	-7950.275	-2107.546	2642.382	-612.894	2069.962	2194.276
18.00	-8065.915	-2072.853	2844.753	-430.760	2347.499	2385.082
20.00	-8311.651	-2350.390	3139.636	-341.139	2682.856	2587.453
22.50	-8522.694	-2593.235	3405.609	-225.499	2928.592	2711.766
25.00	-8516.912	-2552.761	3521.249	-127.204	2989.303	2801.388
27.50	-8612.316	-2732.003	3738.075	-179.243	3023.995	2801.388
28.00	-8733.738	-2931.483	3824.805	-196.589	3084.707	2801.388
30.00	-8806.013	-3084.707	4058.977	-161.897	3102.053	2862.099
30.10	-8915.872	-3503.903	4238.219	-387.395	3148.309	2867.881
36.10	-8930.327	-3720.729	4509.974	-378.722	3128.072	2957.502
36.20	-8950.564	-3836.369	4657.415	-213.935	3044.232	3102.053
Final Grade	7337.381	18274.068	64677.653	17496.386	20925.123	49777.392

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI3_1B 1	RI3_5B 5	RI3_7B 7	RI3_9B 9	RI3_13B 13	RI3_17B 17	RI3_23B 23
10.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.00	719.861	6.1E+07	-1682.567	-1777.971	30017.346	-112.749	3321.769
15.00	821.047	16793.871	-2315.698	-2315.698	39913.270	251.518	3174.328
18.00	841.284	16976.005	-2506.505	-2471.813	38161.318	364.267	3235.039
20.00	826.829	16764.961	-2653.946	-2570.107	34576.467	407.632	3180.110
22.50	442.324	16840.127	-2792.715	-2627.927	-54249.78	459.670	3183.001
25.00	326.684	16418.040	-2896.791	-2697.311	-10052.04	546.401	3226.366
27.50	95.403	16418.040	-3000.867	-2694.420	Bad Gage	494.363	3235.039
28.00	78.057	16869.037	-3026.886	-2662.619	Bad Gage	468.343	3209.020
30.00	-156.114	16418.040	-3226.366	-2734.894	Bad Gage	-6007.517	3220.584
30.10	-349.812	16418.040	-3226.366	-2659.728	Bad Gage	494.363	3217.693
36.10	-1595.837	16435.386	-3304.423	-2705.984	Bad Gage	537.728	3330.442
36.20	-2460.249	16892.165	-3087.598	-2749.350	Bad Gage	581.093	3451.865
Final Grade	Bad Gage	Bad Gage	Bad Gage	-15466.90	Bad Gage	19731.136	32220.29

Table E15. Tabulated data for primary bar mat IL3 located in the intermediate and primary reinforced section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat IL1 (ft)	LI3_3T 3	LI3_5T 5	LI3_7T 7	LI3_11T 11	LI3_15T 15	LI3_19T 19
10.00	0.000	0.000	0.000	0.000	0.000	0.000
12.00	9661.752	2758.023	-1257.589	1968.777	818.156	1222.897
15.00	9008.384	3665.799	-615.785	2558.543	783.463	925.123
18.00	9025.730	3989.592	-372.940	2671.292	821.047	821.047
20.00	8782.885	4405.898	-182.134	2653.946	806.592	795.027
22.50	8542.931	4709.454	-60.711	2688.638	792.136	725.643
25.00	8551.605	4926.279	8.673	2801.388	852.848	656.259
27.50	8196.010	5099.740	34.692	2775.369	540.619	690.951
28.00	8048.569	5203.816	-8.673	2671.292	627.349	725.643
30.00	7857.762	5484.244	86.730	2732.003	543.510	751.662
30.10	7745.013	5663.487	14.455	2549.870	514.600	832.611
36.10	7797.051	6221.451	8.673	2558.543	751.662	821.047
36.20	7753.686	6892.165	-20.237	2564.325	Bad Gage	679.387
Final Grade	10254.409	39580.80	23975.137	74579.358	-18485.111	-62584.56

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI3_1T 1	RI3_5T 5	RI3_7T 7	RI3_9T 9	RI3_13T 13	RI3_17T 17	RI3_23T 23
10.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.00	Bad Gage	4.1E+03	Bad Gage	893.322	29916.161	991.616	3313.096
15.00	Bad Gage	4079.214	Bad Gage	537.728	39765.828	1069.673	3451.865
18.00	Bad Gage	4304.712	Bad Gage	407.632	37710.321	1121.711	3376.698
20.00	Bad Gage	4183.290	Bad Gage	459.670	35053.484	1078.346	3339.115
22.50	Bad Gage	4209.309	Bad Gage	485.690	25802.255	1043.654	3255.276
25.00	Bad Gage	Bad Gage	Bad Gage	442.324	-13943.34	1092.801	3217.693
27.50	Bad Gage	Bad Gage	Bad Gage	581.093	-18337.67	939.578	3211.911
28.00	Bad Gage	Bad Gage	Bad Gage	719.861	-7684.302	766.117	3191.674
30.00	Bad Gage	Bad Gage	Bad Gage	823.938	Bad Gage	566.638	3148.309
30.10	Bad Gage	Bad Gage	Bad Gage	1225.788	-9028.621	245.736	3096.271
36.10	Bad Gage	Bad Gage	Bad Gage	1789.535	-12266.551	-31.801	2983.521
36.20	Bad Gage	Bad Gage	Bad Gage	893.322	Bad Gage	-75.166	2726.221
Final Grade	Bad Gage	Bad Gage	Bad Gage	-8600.752	Bad Gage	17857.762	-19893.03

Table E16. Tabulated data for primary bar mat PL3 located in the primary reinforced only section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL1 (ft)	LP3_3 3	LP3_5 5	LP3_7 7	LP3_11 11	LP3_15 15	LP3_19 19
12.00	0.000	Bad Gage	0.000	0.000	0.000	0.000
18.00	Bad Gage	Bad Gage	Bad Gage	883.688	Bad Gage	395.745
20.00	Bad Gage	Bad Gage	Bad Gage	1035.461	Bad Gage	523.404
22.50	Bad Gage	Bad Gage	Bad Gage	1165.957	Bad Gage	634.043
25.00	13185.816	Bad Gage	Bad Gage	1208.511	Bad Gage	702.128
27.50	Bad Gage	Bad Gage	Bad Gage	1208.511	Bad Gage	713.475
28.00	Bad Gage	Bad Gage	Bad Gage	1214.184	Bad Gage	733.333
30.00	Bad Gage	Bad Gage	Bad Gage	1242.553	-4438.298	774.468
36.10	Bad Gage	Bad Gage	Bad Gage	1676.596	Bad Gage	1642.553
36.20	Bad Gage	Bad Gage	Bad Gage	1365.957	Bad Gage	1034.043
Final Grade	Bad Gage	Bad Gage	Bad Gage	2744.681	Bad Gage	-86.525

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP3_1 1	RP3_5 5	RP3_7 7	RP3_9 9	RP3_13 13	RP3_17 17	RP3_23 18
12.00	0.000	Bad Gage	Bad Gage	Bad Gage	Bad Gage	0.000	0.000
18.00	32.624	Bad Gage	Bad Gage	Bad Gage	Bad Gage	226.950	51.064
20.00	354.610	Bad Gage	Bad Gage	Bad Gage	Bad Gage	170.213	76.596
22.50	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	112.057
25.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	161.702
27.50	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	144.681
28.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	165.957
30.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	229.787
36.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	504.965
36.20	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	689.362
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	2514.894

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D

Table E17. Tabulated data for primary bar mat PL3 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL1 (ft)	LP3_3B 3	LP3_5B 5	LP3_7B 7	LP3_11B 11	LP3_15B 15	LP3_19B 19
12.00	0.000	Bad Gage	0.000	0.000	0.000	0.000
15.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	404.741	268.864
18.00	7383.637	Bad Gage	-607.112	1182.423	520.382	433.651
20.00	7924.256	Bad Gage	-913.559	1251.807	624.458	543.510
22.50	7880.890	Bad Gage	-1113.038	1468.633	644.695	650.477
25.00	7993.640	Bad Gage	-1248.916	1558.254	659.150	719.861
27.50	7993.640	Bad Gage	-1292.281	1543.799	598.439	702.515
28.00	7973.403	Bad Gage	-1309.627	1590.055	572.420	702.515
30.00	-7993.640	Bad Gage	-1526.453	1656.548	520.382	740.098
36.10	-8542.931	Bad Gage	-1451.286	1717.259	589.766	615.785
36.20	-7915.583	Bad Gage	-1841.573	1873.374	442.324	904.886
Final Grade	Bad Gage	Bad Gage	-25588.32	16221.451	18644.117	19069.095

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP3_1B 1	RP3_5B 5	RP3_7B 7	RP3_9B 9	RP3_13B 13	RP3_17B 17	RP3_23B 18
12.00	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
15.00	-130.095	Bad Gage	-450.997	Bad Gage	11968.777	320.902	-104.076
18.00	-433.651	Bad Gage	-725.643	Bad Gage	8444.637	424.978	-2.891
20.00	-396.068	Bad Gage	-913.559	Bad Gage	Bad Gage	231.281	8.673
22.50	-242.845	Bad Gage	-1066.782	Bad Gage	-8670.136	Bad Gage	34.692
25.00	-199.480	Bad Gage	-1188.205	Bad Gage	-51792.43	Bad Gage	60.711
27.50	-60.711	Bad Gage	-1257.589	Bad Gage	Bad Gage	Bad Gage	69.384
28.00	-60.711	Bad Gage	-1300.954	Bad Gage	Bad Gage	Bad Gage	34.692
30.00	52.038	Bad Gage	-1457.069	Bad Gage	Bad Gage	Bad Gage	112.749
36.10	121.422	Bad Gage	-1569.818	Bad Gage	Bad Gage	Bad Gage	329.575
36.20	268.864	Bad Gage	-1908.066	Bad Gage	Bad Gage	Bad Gage	450.997
Final Grade	-33703.38	Bad Gage	-16715.814	Bad Gage	Bad Gage	Bad Gage	25712.634

Table E18. Tabulated data for primary bar mat PL3 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)					
Height of fill above bar mat PL1 (ft)	LP3_3T 3	LP3_5T 5	LP3_7T 7	LP3_11T 11	LP3_15T 15	LP3_19T 19
12.00	0.000	Bad Gage	0.000	0.000	0.000	0.000
12.00	12416.883	Bad Gage	-5617.230	3584.851	73908.64	-8907.199
18.00	7996.531	Bad Gage	Bad Gage	4391.443	Bad Gage	-8551.605
20.00	7996.531	Bad Gage	Bad Gage	4495.519	Bad Gage	-8421.509
22.50	7996.531	Bad Gage	Bad Gage	4611.159	Bad Gage	-8282.741
25.00	8013.877	Bad Gage	Bad Gage	4694.999	Bad Gage	-8204.683
27.50	8016.768	Bad Gage	Bad Gage	4634.287	Bad Gage	-8187.337
28.00	Bad Gage	Bad Gage	Bad Gage	4573.576	Bad Gage	-8152.645
30.00	-8355.016	Bad Gage	Bad Gage	4556.230	63223.475	-8091.934
36.10	-7690.084	Bad Gage	Bad Gage	4345.186	Bad Gage	-8158.427
36.20	-7687.193	Bad Gage	Bad Gage	4423.244	Bad Gage	-7883.781
Final Grade	Bad Gage	Bad Gage	Bad Gage	24787.511	Bad Gage	13628.216

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP3_1T 1	RP3_5T 5	RP3_7T 7	RP3_9T 9	RP3_13T 13	RP3_17T 17	RP3_23T 18
12.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.00	16886.383	Bad Gage	72518.069	0.000	Bad Gage	1006.071	-8175.773
18.00	17250.650	Bad Gage	Bad Gage	-832.611	Bad Gage	1101.474	-8065.915
20.00	16470.078	8658.572	Bad Gage	-965.597	Bad Gage	1150.622	-8031.223
22.50	-24741.255	7768.141	93477.884	-1118.820	Bad Gage	1228.679	-7987.858
25.00	Bad Gage	7718.994	Bad Gage	-1179.532	Bad Gage	1283.608	-7961.839
27.50	Bad Gage	7742.122	58401.272	-1193.987	Bad Gage	1231.570	-7944.493
28.00	Bad Gage	7999.422	49647.297	-1196.878	Bad Gage	1196.878	-7909.801
30.00	Bad Gage	7698.757	55209.598	-1266.262	Bad Gage	1179.532	-7828.852
36.10	Bad Gage	7762.359	Bad Gage	-2.0E+07	Bad Gage	763.226	-7502.168
36.20	Bad Gage	8135.299	Bad Gage	Bad Gage	Bad Gage	555.074	-7447.239
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	19809.193	17204.394

Table E19. Tabulated data for primary bar mat IL4 located in the intermediate and primary reinforced section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI4_3 3	LI4_7 7	LI4_9 9	LI4_11 11	LI4_15 15	LI4_19 19	LI4_23 23
15.00	0.000	0.000	0.000	0.000	0.000	Bad Gage	Bad Gage
18.00	132.123	223.649	327.724	Bad Gage	190.434	Bad Gage	Bad Gage
20.00	308.533	684.234	670.948	-20575.731	428.107	Bad Gage	Bad Gage
22.50	394.154	916.740	856.953	-22738.41	551.373	Bad Gage	Bad Gage
25.00	453.942	1042.958	957.337	-22863.89	622.232	Bad Gage	Bad Gage
27.50	431.798	1103.484	972.099	Bad Gage	571.302	Bad Gage	Bad Gage
28.00	405.226	1100.531	954.384	Bad Gage	537.349	Bad Gage	Bad Gage
30.00	-1330.824	1242.250	1031.149	Bad Gage	511.515	Bad Gage	Bad Gage
30.10	-1561.116	1238.559	1011.957	-15881.311	409.655	Bad Gage	Bad Gage
36.10	-1897.697	1364.777	1082.817	Bad Gage	447.298	Bad Gage	Bad Gage
36.20	-2457.189	1423.826	1107.174	-23122.23	306.318	Bad Gage	Bad Gage
Final Grade	Bad Gage	Bad Gage	6654.119	Bad Gage	86.360	Bad Gage	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI4_1 1	RI4_5 5	RI4_7 7	RI4_9 9	RI4_13 13	RI4_17 17	RI4_21 21
15.00	0.000	0.000	0.000	0.000	0.000	0.000	Bad Gage
18.00	-1537.496	341.010	973.575	Bad Gage	1646.738	-680.543	Bad Gage
20.00	-5378.654	544.730	462.799	Bad Gage	496.014	360.939	Bad Gage
22.50	-6718.335	717.449	586.064	Bad Gage	648.804	507.086	Bad Gage
25.00	-7196.634	829.643	686.448	Bad Gage	744.021	608.946	Bad Gage
27.50	-8571.745	850.310	710.806	Bad Gage	741.807	597.874	Bad Gage
28.00	-9599.203	825.952	676.853	Bad Gage	739.593	576.469	Bad Gage
30.00	-12367.139	812.666	770.593	Bad Gage	779.451	580.159	Bad Gage
30.10	-13411.574	734.426	713.758	Bad Gage	768.379	533.658	Bad Gage
36.10	-19412.459	738.116	811.190	Bad Gage	840.714	557.278	Bad Gage
36.20	-21560.38	698.258	859.906	Bad Gage	825.952	575.731	Bad Gage
Final Grade	Bad Gage	859.906	1823.147	Bad Gage	2783.437	53.144	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E20. Tabulated data for primary bar mat IL4 located in the intermediate and primary reinforced section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI4_3B 3	LI4_7B 7	LI4_9B 9	LI4_11B 11	LI4_15B 15	LI4_19B 19	LI4_23B 23
15.00	0.000	0.000	0.000	0.000	0.000	0.000	Bad Gage
18.00	-971.272	151.409	1113.016	388.187	32.215	-20928.25	Bad Gage
20.00	-908.652	620.267	1496.697	815.209	254.551	-23695.83	Bad Gage
22.50	-1031.094	865.152	1714.194	1061.705	362.494	-26768.16	Bad Gage
25.00	-1042.372	1006.928	1835.025	1182.536	443.048	-25095.86	Bad Gage
27.50	-1163.203	1084.260	1868.858	1163.203	365.716	-17062.99	Bad Gage
28.00	-1279.201	1084.260	1873.691	1143.870	307.717	243.274	Bad Gage
30.00	-5137.748	1258.257	1930.079	1201.869	230.385	-30845.01	Bad Gage
30.10	-5640.406	1219.591	1951.023	1110.037	99.887	-2630.901	Bad Gage
36.10	-6457.226	1374.255	2047.688	1148.703	478.492	Bad Gage	Bad Gage
36.20	-7733.204	1424.198	2094.410	1250.201	-132.109	Bad Gage	Bad Gage
Final Grade	Bad Gage	16797.164	18931.851	10742.710	10687.933	Bad Gage	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI4_1B 1	RI4_5B 5	RI4_7B 7	RI4_9B 9	RI4_13B 13	RI4_17B 17	RI4_21B 21
15.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18.00	1266.036	889.124	1106.573	734.494	352.750	67.651	343.086
20.00	2123.409	1308.200	1404.865	947.318	-1040.760	293.217	454.326
22.50	2116.965	1530.530	1478.975	1108.426	Bad Gage	468.826	542.935
25.00	2058.966	1607.862	1599.807	1208.313	Bad Gage	607.379	618.656
27.50	1817.303	1680.361	1623.973	1237.313	-16478.170	625.101	599.323
28.00	1546.641	1702.916	1570.807	1203.480	Bad Gage	613.823	584.824
30.00	1449.976	1709.360	1644.917	1292.090	-39642.34	657.322	575.157
30.10	1432.254	1680.361	1590.140	1222.813	Bad Gage	618.656	550.991
36.10	1280.812	1714.194	1638.473	1501.531	-24707.59	694.377	657.322
36.20	1245.368	1806.025	1696.472	1304.978	-32360.24	739.488	687.933
Final Grade	-4714.033	11467.698	16618.334	9179.958	Bad Gage	12666.344	13549.219

Table E21. Tabulated data for primary bar mat IL4 located in the intermediate and primary reinforced section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI4_3T 3	LI4_7T 7	LI4_9T 9	LI4_11T 11	LI4_15T 15	LI4_19T 19	LI4_23T 23
15.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15.00	-886.096	48.333	-866.763	-336.717	-473.659	-5364.911	-1364.588
18.00	389.882	333.494	-1267.923	Bad Gage	-93.443	Bad Gage	-69.277
20.00	723.377	857.097	-902.207	-45677.461	191.719	Bad Gage	-981.150
22.50	1013.372	1143.870	-707.266	-50510.714	338.328	Bad Gage	-823.264
25.00	1153.536	1275.979	-608.990	-50800.71	443.048	Bad Gage	-739.488
27.50	1235.702	1348.478	-605.768	Bad Gage	401.160	Bad Gage	-692.766
30.00	1390.366	1478.975	-542.935	Bad Gage	381.827	Bad Gage	-562.268
30.10	1371.033	1435.476	-586.435	-35769.29	335.106	Bad Gage	-501.047
36.10	1404.865	1551.474	-538.102	Bad Gage	285.162	Bad Gage	-378.605
36.20	1467.698	1627.195	-489.770	-51590.140	259.385	Bad Gage	-526.825
Final Grade	6455.615	Bad Gage	24245.207	Bad Gage	11197.036	Bad Gage	11564.363

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI4_1T 1	RI4_5T 5	RI4_7T 7	RI4_9T 9	RI4_13T 13	RI4_17T 17	RI4_21T 21
15.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15.00	0.000	832.931	82.165	294.828	-588.046	-1393.588	Bad Gage
18.00	-4564.202	323.828	-618.656	Bad Gage	-2257.129	-1274.368	Bad Gage
20.00	-13745.771	784.598	-309.328	Bad Gage	-3125.503	-916.707	Bad Gage
22.50	-16632.83	847.430	-140.164	Bad Gage	-5717.738	-789.431	Bad Gage
25.00	-17623.65	923.151	-32.222	Bad Gage	Bad Gage	-683.100	Bad Gage
27.50	-20362.49	919.929	3.222	Bad Gage	-29304.01	-726.599	Bad Gage
30.00	-28169.81	789.431	82.165	Bad Gage	-33766.715	-789.431	Bad Gage
30.10	-30393.10	629.934	33.833	Bad Gage	Bad Gage	-900.596	Bad Gage
36.10	Bad Gage	538.102	125.665	Bad Gage	Bad Gage	-948.929	Bad Gage
36.20	Bad Gage	555.824	188.497	Bad Gage	Bad Gage	-963.428	Bad Gage
Final Grade	Bad Gage	9268.568	5717.738	Bad Gage	Bad Gage	10588.046	Bad Gage

Table E22. Tabulated data for primary bar mat PL4 located in the primary reinforced only section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP4_3 3	LP4_7 7	LP4_9 9	LP4_11 11	LP4_15 15	LP4_19 19	LP4_23 23
15.00	0.000	Bad Gage	0.000	0.000	0.000	0.000	0.000
18.00	Bad Gage	Bad Gage	391.940	390.464	658.400	Bad Gage	104.813
20.00	Bad Gage	Bad Gage	673.162	722.616	735.902	11541.925	117.360
22.50	Bad Gage	Bad Gage	842.191	858.429	718.187	Bad Gage	169.029
25.00	Bad Gage	Bad Gage	910.097	924.122	804.547	Bad Gage	236.935
27.50	Bad Gage	Bad Gage	876.882	862.120	653.233	Bad Gage	257.603
28.00	Bad Gage	Bad Gage	817.095	806.761	510.038	Bad Gage	256.864
30.00	Bad Gage	Bad Gage	810.452	766.903	325.509	Bad Gage	285.651
36.10	Bad Gage	Bad Gage	668.733	580.898	-311.485	16835.695	316.652
36.20	Bad Gage	Bad Gage	699.734	590.493	-502.657	Bad Gage	334.367
Final Grade	Bad Gage	Bad Gage	Bad Gage	-4224.240	-3472.099	Bad Gage	1981.104

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP4_1 1	RP4_5 5	RP4_7 7	RP4_9 9	RP4_13 13	RP4_17 17	RP4_21 21
15.00	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
18.00	148.361	-1546.354	408.916	Bad Gage	Bad Gage	233.983	147.623
20.00	68.645	Bad Gage	808.237	Bad Gage	-5181.577	416.298	163.862
22.50	28.787	Bad Gage	1035.577	Bad Gage	18474.314	537.349	414.083
25.00	22.143	Bad Gage	1178.034	Bad Gage	Bad Gage	635.518	524.801
27.50	-39.120	Bad Gage	1251.107	Bad Gage	-10877.62	615.589	586.802
28.00	-15357.248	17711.839	2276.351	Bad Gage	2475.64	Bad Gage	405.226
30.00	-28.787	Bad Gage	1401.683	Bad Gage	-12615.88	552.111	681.281
36.10	Bad Gage	Bad Gage	1550.044	Bad Gage	-13246.24	99.646	788.308
36.20	Bad Gage	1701.358	1669.619	Bad Gage	-13556.24	59.787	850.310
Final Grade	Bad Gage	Bad Gage	2122.084	Bad Gage	Bad Gage	1004.576	941.836

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E23. Tabulated data for primary bar mat PL4 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP4_3B 3	LP4_7B 7	LP4_9B 9	LP4_11B 11	LP4_15B 15	LP4_19B 19	LP4_23B 23
15.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18.00	621.743	Bad Gage	544.428	209.395	853.688	1195.164	-380.133
20.00	985.984	Bad Gage	974.706	476.881	861.930	720.155	-293.217
22.50	981.150	Bad Gage	1092.315	642.823	895.763	489.770	-215.885
25.00	1002.094	-8226.196	1169.647	716.932	907.040	494.603	-148.220
27.50	Bad Gage	-6586.112	1092.315	599.323	766.876	315.773	-80.554
28.00	Bad Gage	1060.093	3605.607	-1383.921	626.712	156.275	-61.221
30.00	Bad Gage	Bad Gage	958.595	436.604	404.382	9.667	1.611
36.10	Bad Gage	Bad Gage	805.542	128.887	-339.939	-459.159	141.775
36.20	Bad Gage	Bad Gage	816.820	120.831	-557.435	-576.768	214.274
Final Grade	Bad Gage	Bad Gage	24726.921	-13655.550	11411.310	23613.662	19244.401

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP4_1B 1	RP4_5B 5	RP4_7B 7	RP4_9B 9	RP4_13B 13	RP4_17B 17	RP4_21B 21
15.00	Bad Gage	Bad Gage	0.000	Bad Gage	0.000	0.000	0.000
18.00	Bad Gage	Bad Gage	1594.625	Bad Gage	-1668.719	-27.382	1198.385
20.00	Bad Gage	Bad Gage	2060.577	Bad Gage	-5563.074	48.333	1029.483
22.50	Bad Gage	Bad Gage	2308.684	Bad Gage	Bad Gage	149.831	1279.201
25.00	Bad Gage	Bad Gage	2463.348	Bad Gage	-31282.42	235.218	1366.199
27.50	Bad Gage	Bad Gage	2540.680	Bad Gage	Bad Gage	141.775	1391.977
28.00	Bad Gage	Bad Gage	2545.513	Bad Gage	Bad Gage	49.944	1375.866
30.00	Bad Gage	Bad Gage	2700.177	Bad Gage	-23911.713	-46.721	1404.865
36.10	Bad Gage	Bad Gage	2883.841	Bad Gage	Bad Gage	-1055.260	1472.531
36.20	Bad Gage	Bad Gage	2975.673	Bad Gage	Bad Gage	-1153.536	1540.197
Final Grade	Bad Gage	Bad Gage	13541.163	Bad Gage	Bad Gage	9113.904	14699.533

Table E24. Tabulated data for primary bar mat PL4 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP4_3T 3	LP4_7T 7	LP4_9T 9	LP4_11T 11	LP4_15T 15	LP4_19T 19	LP4_23T 23
15.00	0.000	Bad Gage	0.000	0.000	0.000	0.000	0.000
18.00	4474.615	Bad Gage	164.295	608.857	285.100	37172.489	468.723
20.00	5131.303	Bad Gage	217.496	937.651	420.493	23692.61	455.937
22.50	4755.921	Bad Gage	455.937	1116.481	444.659	Bad Gage	486.547
25.00	Bad Gage	Bad Gage	560.657	1214.758	478.492	Bad Gage	550.991
27.50	Bad Gage	Bad Gage	567.102	1169.647	328.661	Bad Gage	565.491
28.00	Bad Gage	Bad Gage	525.213	1121.315	183.664	Bad Gage	542.935
30.00	Bad Gage	Bad Gage	542.935	1121.315	-4.833	Bad Gage	562.268
36.10	Bad Gage	Bad Gage	449.493	952.151	-671.822	36713.388	541.324
36.20	Bad Gage	Bad Gage	531.658	952.151	-869.986	Bad Gage	488.159
Final Grade	Bad Gage	Bad Gage	Bad Gage	23800.55	10325.439	Bad Gage	15682.294

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP4_1T 1	RP4_5T 5	RP4_7T 7	RP4_9T 9	RP4_13T 13	RP4_17T 17	RP4_21T 21
15.00	Bad Gage	0.000	0.000	0.000	0.000	0.000	0.000
18.00	Bad Gage	93.422	-1011.540	-1638.115	Bad Gage	354.361	-1017.983
20.00	Bad Gage	544.546	-594.490	-1227.646	26763.33	629.934	-865.152
22.50	Bad Gage	687.933	-323.828	-976.317	Bad Gage	828.097	-552.602
25.00	Bad Gage	850.652	-178.830	-865.152	Bad Gage	963.428	-423.715
27.50	Bad Gage	869.986	-86.999	-853.875	Bad Gage	997.261	-302.884
28.00	Bad Gage	863.541	-77.332	-865.152	Bad Gage	997.261	-230.385
30.00	Bad Gage	966.651	77.332	-807.153	Bad Gage	1043.983	-119.220
36.10	Bad Gage	Bad Gage	4093.765	-1986.467	7393.266	Bad Gage	842.597
36.20	Bad Gage	Bad Gage	4219.430	-1846.303	7480.264	Bad Gage	876.430
Final Grade	Bad Gage	159.497	10357.661	6089.899	Bad Gage	13866.602	14037.377

Table E25. Tabulated data for primary bar mat IL5 located in the intermediate and primary reinforced section (full bridge data).

Left Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb) LI5_3 3	LI5_7 7	LI5_9 9	LI5_11 11	LI5_15 15	LI5_19 19	LI5_23 23
20.00	0.000	0.000	0.000	0.000	0.000	0.000	Bad Gage
22.50	Bad Gage	-507.086	35.430	Bad Gage	239.150	-1501.329	Bad Gage
25.00	Bad Gage	Bad Gage	246.531	Bad Gage	265.722	-1443.756	Bad Gage
27.50	Bad Gage	Bad Gage	170.505	Bad Gage	-28.787	-1492.471	Bad Gage
28.00	Bad Gage	Bad Gage	137.290	Bad Gage	-39.858	-1586.950	Bad Gage
30.00	4958.665	-10176.410	130.647	Bad Gage	-42.073	-1637.880	Bad Gage
30.10	7128.727	Bad Gage	70.859	Bad Gage	-181.577	-2604.074	Bad Gage
36.10	7150.133	-8881.754	157.219	Bad Gage	-280.484	-2815.176	Bad Gage
36.20	Bad Gage	-9120.165	197.815	Bad Gage	-434.012	-4459.699	Bad Gage
Final Grade	Bad Gage	6062.888	15185.267	Bad Gage	3043.992	Bad Gage	Bad Gage
Final Grade	Bad Gage	5222.173	15419.250	Bad Gage	3018.896	Bad Gage	Bad Gage

Right Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb) RI5_1 1	RI5_5 5	RI5_7 7	RI5_9 9	RI5_13 13	RI5_17 17	RI5_21 21
20.00	Bad Gage	0.000	0.000	0.000	0.000	0.000	0.000
22.50	Bad Gage	793.475	-4923.236	6214.201	465.013	215.530	2251.993
25.00	Bad Gage	416.298	-3244.021	Bad Gage	758.045	451.727	2402.569
27.50	Bad Gage	518.158	-5492.324	Bad Gage	815.619	538.087	2533.215
28.00	Bad Gage	529.229	-19081.045	Bad Gage	804.547	560.230	2524.358
30.00	Bad Gage	668.733	Bad Gage	Bad Gage	917.479	766.165	2570.859
30.10	Bad Gage	655.447	Bad Gage	Bad Gage	862.120	797.166	2996.014
36.10	Bad Gage	696.044	Bad Gage	1676.262	866.549	963.242	3469.885
36.20	Bad Gage	675.376	Bad Gage	2004.724	826.690	1069.531	3660.319
Final Grade	Bad Gage	10290.818	Bad Gage	-12042.37	Bad Gage	Bad Gage	8447.003
Final Grade	Bad Gage	12483.023	Bad Gage	-12359.758	Bad Gage	Bad Gage	8755.536

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E26. Tabulated data for primary bar mat IL5 located in the intermediate and primary reinforced section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI5_3B 3	LI5_7B 7	LI5_9B 9	LI5_11B 11	LI5_15B 15	LI5_19B 19	LI5_23B 23
20.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22.50	-41941.357	-1008.539	1986.467	Bad Gage	1419.365	-1114.870	1303.367
25.00	1201.869	Bad Gage	2049.299	Bad Gage	1516.030	-1126.148	1367.811
27.50	Bad Gage	Bad Gage	1831.803	Bad Gage	1240.535	-1300.145	1327.533
28.00	Bad Gage	-30844.21	1870.469	Bad Gage	1108.426	-1503.142	1246.979
30.00	Bad Gage	-20027.39	1976.800	36911.551	1005.317	-1739.971	1147.092
30.10	Bad Gage	-44780.09	2017.077	38458.192	771.709	-3755.437	575.157
36.10	Bad Gage	-18714.35	2155.631	35654.906	596.101	-4254.874	67.666
36.20	Bad Gage	-20243.27	2323.184	34736.588	467.214	-7704.205	-331.883
Final Grade	Bad Gage	-24807.48	Bad Gage	Bad Gage	14792.976	12348.961	14649.589

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI5_1B 1	RI5_5B 5	RI5_7B 7	RI5_9B 9	RI5_13B 13	RI5_17B 17	RI5_21B 21
20.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22.50	3798.937	1661.028	-3006.283	15147.414	Bad Gage	256.162	4546.480
25.00	Bad Gage	309.328	-1691.638	3592.718	Bad Gage	570.324	4643.145
27.50	4446.593	405.993	-3421.943	Bad Gage	-23510.553	681.489	4618.979
28.00	4335.428	441.437	-14192.041	Bad Gage	Bad Gage	739.488	4527.147
30.00	Bad Gage	468.826	Bad Gage	Bad Gage	Bad Gage	1056.871	4502.981
30.10	Bad Gage	405.993	-46573.22	Bad Gage	Bad Gage	1213.146	4356.372
36.10	Bad Gage	463.992	Bad Gage	3070.727	-33982.60	1623.973	4275.818
36.20	Bad Gage	517.158	-34248.43	3779.604	Bad Gage	2023.522	4174.319
Final Grade	Bad Gage	11648.139	Bad Gage	-6267.118	Bad Gage	Bad Gage	28371.194

Table E27. Tabulated data for primary bar mat IL5 located in the intermediate and primary reinforced section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI5_3T 3	LI5_7T 7	LI5_9T 9	LI5_11T 11	LI5_15T 15	LI5_19T 19	LI5_23T 23
20.00	Bad Gage	0.000	0.000	0.000	0.000	0.000	Bad Gage
22.50	Bad Gage	-386.660	-1100.371	Bad Gage	-916.707	-2199.130	Bad Gage
25.00	Bad Gage	309.328	-718.544	Bad Gage	-950.540	-1976.800	Bad Gage
27.50	Bad Gage	476.881	-665.378	Bad Gage	-1303.367	-1909.135	Bad Gage
28.00	Bad Gage	434.993	-781.376	Bad Gage	-1182.536	-1928.468	Bad Gage
30.00	Bad Gage	584.824	-881.263	Bad Gage	-1119.704	-1794.748	Bad Gage
30.10	Bad Gage	444.659	-1071.371	Bad Gage	-1143.870	-1880.135	Bad Gage
36.10	Bad Gage	507.492	-1011.761	Bad Gage	-1174.480	-1846.303	Bad Gage
36.20	Bad Gage	501.047	-1058.482	Bad Gage	-1493.475	-1918.801	Bad Gage
Final Grade	Bad Gage	Bad Gage	11369.422	Bad Gage	20533.27	Bad Gage	Bad Gage

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	RI5_1T 1	RI5_5T 5	RI5_7T 7	RI5_9T 9	RI5_13T 13	RI5_17T 17	RI5_21T 21
20.00	Bad Gage	0.000	0.000	0.000	0.000	0.000	0.000
22.50	Bad Gage	124.053	444.659	173.997	Bad Gage	140.164	288.384
25.00	Bad Gage	559.046	802.320	596.101	Bad Gage	420.493	546.158
27.50	Bad Gage	708.877	874.819	662.156	Bad Gage	478.492	855.486
28.00	Bad Gage	837.764	855.486	608.990	Bad Gage	463.992	937.651
30.00	Bad Gage	887.707	966.651	666.989	Bad Gage	608.990	1024.650
30.10	Bad Gage	873.208	961.817	507.492	Bad Gage	478.492	2112.131
36.10	Bad Gage	948.929	1024.650	476.881	Bad Gage	405.993	3180.280
36.20	Bad Gage	1010.150	1010.150	459.159	Bad Gage	199.774	3676.494
Final Grade	Bad Gage	22848.40	23663.61	-25329.47	Bad Gage	Bad Gage	29397.454

Table E28. Tabulated data for primary bar mat PL5 located in the primary reinforced only section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP5_3 3	LP5_7 7	LP5_9 9	LP5_11 11	LP5_15 15	LP5_19 19	LP5_23 23
20.00	0.000	0.000	Bad Gage	0.000	0.000	0.000	0.000
22.50	183.791	-2418.807	Bad Gage	340.272	Bad Gage	Bad Gage	24.358
25.00	Bad Gage	-3804.990	Bad Gage	744.021	Bad Gage	Bad Gage	53.144
27.50	Bad Gage	-3918.660	Bad Gage	854.739	Bad Gage	Bad Gage	88.574
28.00	Bad Gage	-3295.689	Bad Gage	892.383	Bad Gage	Bad Gage	239.150
30.00	Bad Gage	Bad Gage	Bad Gage	1025.244	Bad Gage	Bad Gage	357.986
36.10	Bad Gage	Bad Gage	Bad Gage	1090.198	Bad Gage	Bad Gage	735.164
36.20	Bad Gage	Bad Gage	Bad Gage	1153.676	Bad Gage	Bad Gage	758.784
Final Grade	Bad Gage	Bad Gage	Bad Gage	-3317.095	Bad Gage	Bad Gage	-5947.741

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP5_1 1	RP5_5 5	RP5_7 7	RP5_9 9	RP5_13 13	RP5_17 17	RP5_21 21
20.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22.50	-5.167	-1405.373	267.198	Bad Gage	384.559	205.934	10675.376
25.00	50.930	Bad Gage	640.685	Bad Gage	735.164	484.942	Bad Gage
27.50	-31.001	Bad Gage	642.899	Bad Gage	868.025	515.943	Bad Gage
28.00	6.643	Bad Gage	572.040	Bad Gage	923.384	518.158	Bad Gage
30.00	-31.001	Bad Gage	569.088	Bad Gage	1093.150	653.233	Bad Gage
36.10	Bad Gage	Bad Gage	36.168	Bad Gage	1231.916	699.734	Bad Gage
36.20	Bad Gage	Bad Gage	-51.668	Bad Gage	1314.585	721.140	Bad Gage
Final Grade	Bad Gage	Bad Gage	4623.561	Bad Gage	13329.643	2110.275	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E29. Tabulated data for primary bar mat PL5 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP5_3B 3	LP5_7B 7	LP5_9B 9	LP5_11B 11	LP5_15B 15	LP5_19B 19	LP5_23B 23
20.00	0.000	0.000	Bad Gage	0.000	0.000	0.000	0.000
22.50	-1802.410	Bad Gage	Bad Gage	797.313	Bad Gage	Bad Gage	1612.343
25.00	Bad Gage	Bad Gage	Bad Gage	1261.479	Bad Gage	Bad Gage	1657.806
27.50	Bad Gage	Bad Gage	Bad Gage	1391.977	Bad Gage	Bad Gage	1688.416
28.00	Bad Gage	Bad Gage	Bad Gage	1451.587	Bad Gage	Bad Gage	1607.862
30.00	1056.871	Bad Gage	Bad Gage	1612.695	Bad Gage	Bad Gage	1551.474
36.10	1052.038	Bad Gage	Bad Gage	1677.139	Bad Gage	Bad Gage	1285.645
36.20	1024.650	Bad Gage	Bad Gage	1710.971	Bad Gage	Bad Gage	1275.979
Final Grade	Bad Gage	Bad Gage	Bad Gage	14229.096	Bad Gage	Bad Gage	16769.776

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP5_1B 1	RP5_5B 5	RP5_7B 7	RP5_9B 9	RP5_13B 13	RP5_17B 17	RP5_21B 21
20.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22.50	1359.458	747.380	2113.281	Bad Gage	Bad Gage	1729.927	Bad Gage
25.00	1783.470	1040.760	2424.682	Bad Gage	-25157.081	2044.466	Bad Gage
27.50	1619.140	1119.704	2424.682	Bad Gage	Bad Gage	2223.296	Bad Gage
28.00	1593.362	1113.259	2366.683	Bad Gage	Bad Gage	2324.795	Bad Gage
30.00	1429.032	1279.201	2303.850	Bad Gage	Bad Gage	2561.624	Bad Gage
36.10	Bad Gage	Bad Gage	5827.292	-1814.081	Bad Gage	Bad Gage	3146.448
36.20	Bad Gage	Bad Gage	6049.621	-2239.407	Bad Gage	Bad Gage	3204.447
Final Grade	Bad Gage	10164.331	10418.882	Bad Gage	Bad Gage	-2853.230	36060.90

Table E30. Tabulated data for primary bar mat PL5 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP5_3T 3	LP5_7T 7	LP5_9T 9	LP5_11T 11	LP5_15T 15	LP5_19T 19	LP5_23T 23
20.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22.50	2203.482	Bad Gage	-557.314	91.812	-344.697	-1217.714	-1572.075
25.00	2611.568	Bad Gage	-169.164	357.661	-29.000	-937.651	-1565.974
27.50	2464.959	Bad Gage	-91.832	439.826	62.832	-715.321	-1841.469
28.00	2411.793	Bad Gage	-106.332	444.659	83.776	-573.546	-2092.798
30.00	2464.959	Bad Gage	-29.000	588.046	251.329	-272.273	-2281.295
36.10	3969.712	Bad Gage	-82.165	555.824	328.661	172.386	-2788.787
36.20	5197.358	Bad Gage	17.722	608.990	164.331	372.160	-2880.619
Final Grade	Bad Gage	Bad Gage	-6819.720	15886.902	20012.889	17970.034	20559.046

Right Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	RP5_1T 1	RP5_5T 5	RP5_7T 7	RP5_9T 9	RP5_13T 13	RP5_17T 17	RP5_21T 21
20.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22.50	-1386.841	-3688.578	-1525.364	1391.977	-25444.74	-1269.257	-613.689
25.00	-1681.972	Bad Gage	-1063.316	898.985	-35132.914	-1003.705	-386.660
27.50	-1706.138	Bad Gage	-1042.372	797.487	Bad Gage	-1119.704	-222.330
28.00	-1681.972	Bad Gage	-1155.147	811.986	Bad Gage	-1216.369	-169.164
30.00	-1469.309	Bad Gage	-1092.315	729.821	Bad Gage	-1163.203	-29.000
36.10	Bad Gage	-5659.739	Bad Gage	2131.464	11933.301	Bad Gage	-144.998
36.20	Bad Gage	-19652.01	Bad Gage	2126.631	11939.745	Bad Gage	-96.665
Final Grade	Bad Gage	Bad Gage	11040.760	-20323.83	Bad Gage	11652.972	Bad Gage

Table E31. Tabulated data for primary bar mat IL6 located in the intermediate and primary reinforced section (full bridge data).

Left Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)						
	LI6_2.5	LI6_6.5	LI6_8.5	LI6_10.5	LI6_13.5	LI6_17.5	LI6_21.5
	2.5	6.5	8.5	10.5	13.5	17.5	21.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	265.722	465.751	318.866	Bad Gage	Bad Gage	243.578	-35.430
28.00	Bad Gage	502.657	303.366	Bad Gage	Bad Gage	-28.787	-199.291
30.00	Bad Gage	994.243	1003.100	Bad Gage	Bad Gage	438.441	3.691
30.10	Bad Gage	1023.767	994.243	Bad Gage	Bad Gage	422.203	-20.667
36.10	Bad Gage	1344.848	1319.014	Bad Gage	Bad Gage	637.733	184.529
36.20	Bad Gage	1420.874	1375.111	Bad Gage	Bad Gage	710.806	290.080
Final Grade	Bad Gage	1726.454	Bad Gage	Bad Gage	Bad Gage	-2601.122	583.850

Right Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)							
	RI6_0.5	RI6_4.5	RI6_7.5	RI6_9.5	RI6_11.5	RI6_15.5	RI6_19.5	RI6_23.5
	0.5	4.5	7.5	9.5	11.5	15.5	19.5	23.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	97.431	170.505	225.864	815.619	605.255	292.294	116.622	Bad Gage
28.00	93.003	25.834	153.528	974.314	574.255	183.791	-58.311	Bad Gage
30.00	37.644	67.907	459.846	1758.193	1217.892	779.451	346.915	Bad Gage
30.10	13.286	-90.788	341.010	2173.753	1197.963	800.118	357.986	Bad Gage
36.10	Bad Gage	-90.788	525.539	2826.986	1437.112	1074.697	652.495	Bad Gage
36.20	Bad Gage	-221.435	434.012	3094.922	1482.138	1145.557	807.499	Bad Gage
Final Grade	Bad Gage	Bad Gage	2073.369	Bad Gage	5.2E+06	Bad Gage	Bad Gage	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E32. Tabulated data for primary bar mat IL6 located in the intermediate and primary reinforced section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI6_2.5B 2.5	LI6_6.5B 6.5	LI6_8.5B 8.5	LI6_10.5B 10.5	LI6_13.5B 13.5	LI6_17.5B 17.5	LI6_21.5B 21.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	1611.084	615.434	840.986	86.999	596.101	750.765	-115.998
28.00	Bad Gage	678.266	802.320	24.166	597.712	388.271	-241.663
30.00	Bad Gage	1325.922	1536.974	565.491	586.435	908.652	49.944
30.10	Bad Gage	1403.254	1536.974	459.159	581.601	866.763	111.165
36.10	Bad Gage	1838.247	1875.302	671.822	586.435	1142.259	381.827
36.20	Bad Gage	1920.412	1918.801	724.988	552.602	1185.758	525.213
Final Grade	Bad Gage	11227.646	Bad Gage	Bad Gage	Bad Gage	17551.152	19002.739

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat IL1 (ft)	RI6_0.5B 0.5	RI6_4.5B 4.5	RI6_7.5B 7.5	RI6_9.5B 9.5	RI6_11.5B 11.5	RI6_15.5B 15.5	RI6_19.5B 19.5	RI6_23.5B 23.5
25.00	0.000	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
27.50	2912.840	-861.930	480.103	473.659	Bad Gage	625.101	135.331	Bad Gage
28.00	2909.618	-1163.203	338.328	530.047	Bad Gage	505.880	-51.555	Bad Gage
30.00	5377.799	-1554.696	589.657	1359.755	Bad Gage	1237.313	357.661	Bad Gage
30.10	5331.078	-1878.524	386.660	1387.144	Bad Gage	1259.868	376.994	Bad Gage
36.10	5843.403	-2253.907	385.049	1785.081	Bad Gage	1577.251	676.655	Bad Gage
36.20	5944.901	-2424.682	304.495	1807.637	Bad Gage	1704.527	844.208	Bad Gage
Final Grade	Bad Gage	28218.141	16102.787	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Table E33. Tabulated data for primary bar mat IL6 located in the intermediate and primary reinforced section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI6_2.5T 2.5	LI6_6.5T 6.5	LI6_8.5T 8.5	LI6_10.5T 10.5	LI6_13.5T 13.5	LI6_17.5T 17.5	LI6_21.5T 21.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	-1063.316	312.550	-144.998	Bad Gage	9729.338	-231.996	43.499
28.00	-926.373	278.718	-154.664	Bad Gage	9698.727	-443.048	-198.163
30.00	Bad Gage	713.710	647.656	Bad Gage	10695.988	45.110	-29.000
30.10	Bad Gage	636.378	618.656	Bad Gage	10517.158	20.944	-96.665
36.10	Bad Gage	897.374	995.650	Bad Gage	10705.655	194.941	-70.888
36.20	Bad Gage	882.874	1116.481	Bad Gage	10691.155	238.440	120.831
Final Grade	Bad Gage	9212.180	31512.808	Bad Gage	Bad Gage	31959.078	16284.840

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat IL1 (ft)	RI6_0.5T 0.5	RI6_4.5T 4.5	RI6_7.5T 7.5	RI6_9.5T 9.5	RI6_11.5T 11.5	RI6_15.5T 15.5	RI6_19.5T 19.5	RI6_23.5T 23.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	-3148.059	1246.979	14.500	1267.923	Bad Gage	3.222	138.553	91.832
28.00	-3128.726	1340.422	0.000	1562.752	Bad Gage	-135.331	-49.944	-165.942
30.00	-5424.521	1691.638	420.493	2437.570	Bad Gage	454.326	394.716	-111.165
30.10	-5337.522	1681.972	367.327	3235.057	Bad Gage	430.159	418.882	-164.331
36.10	Bad Gage	2031.577	646.045	4317.706	Bad Gage	686.322	752.376	-57.999
36.20	Bad Gage	2078.299	647.656	4821.975	-3189.947	749.154	931.207	4.833
Final Grade	Bad Gage	Bad Gage	17394.877	29426.454	Bad Gage	Bad Gage	11574.029	Bad Gage

Table E34. Tabulated data for primary bar mat PL6 located in the primary reinforced only section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP6_2.5 2.5	LP6_6.5 6.5	LP6_8.5 8.5	LP6_10.5 10.5	LP6_13.5 13.5	LP6_17.5 17.5	LP6_21.5 21.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	-25.834	1139.652	420.726	428.107	341.010	81.193	28.048
28.00	-125.480	865.072	420.726	407.440	268.674	124.742	72.335
30.00	Bad Gage	1031.887	1104.222	994.981	790.523	187.482	169.029
36.10	Bad Gage	4742.397	1327.133	1104.222	944.789	205.934	374.963
36.20	Bad Gage	11031.149	1449.660	1186.153	1003.838	223.649	507.086
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	9253.764

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP6_0.5 0.5	RP6_4.5 4.5	RP6_7.5 7.5	RP6_9.5 9.5	RP6_11.5 11.5	RP6_15.5 15.5	RP6_19.5 19.5	RP6_23.5 23.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	-258.341	180.839	241.364	Bad Gage	414.821	436.227	104.074	32.477
28.00	-310.009	95.217	188.220	Bad Gage	392.678	356.510	-33.215	-27.310
30.00	Bad Gage	Bad Gage	642.899	Bad Gage	1046.649	879.097	352.081	74.550
36.10	Bad Gage	Bad Gage	787.570	Bad Gage	1085.031	1111.603	651.019	160.909
36.20	Bad Gage	Bad Gage	692.353	Bad Gage	854.001	1158.105	761.736	222.911
Final Grade	Bad Gage	Bad Gage	-5703.425	Bad Gage	1956.008	Bad Gage	1745.645	-786.832

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E35. Tabulated data for primary bar mat PL6 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP6_2.5B 2.5	LP6_6.5B 6.5	LP6_8.5B 8.5	LP6_10.5B 10.5	LP6_13.5B 13.5	LP6_17.5B 17.5	LP6_21.5B 21.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	-124.026	-9.664	753.823	-470.334	154.630	-454.227	425.233
28.00	-283.551	357.661	734.654	-521.991	91.832	-753.987	275.495
30.00	525.213	167.553	1546.641	91.832	724.988	-492.992	608.990
36.10	646.045	10921.540	1857.580	115.998	895.763	-613.823	816.820
36.20	528.436	Bad Gage	1947.801	188.497	990.817	-647.656	947.318
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	28775.576	23641.050

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP6_0.5B 0.5	RP6_4.5B 4.5	RP6_7.5B 7.5	RP6_9.5B 9.5	RP6_11.5B 11.5	RP6_15.5B 15.5	RP6_19.5B 19.5	RP6_23.5B 23.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	3632.202	1232.211	115.973	1555.968	Bad Gage	196.509	744.159	1333.687
28.00	3492.831	1126.148	43.499	1648.139	Bad Gage	53.166	613.823	1150.314
30.00	Bad Gage	Bad Gage	486.547	2542.291	Bad Gage	169.164	966.651	1261.479
36.10	Bad Gage	Bad Gage	-589.657	1478.975	17489.931	Bad Gage	13156.114	1522.475
36.20	Bad Gage	Bad Gage	-447.881	1345.255	17615.595	Bad Gage	13180.280	1633.639
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	18675.689	18936.684

Table E36. Tabulated data for primary bar mat PL6 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP6_2.5T 2.5	LP6_6.5T 6.5	LP6_8.5T 8.5	LP6_10.5T 10.5	LP6_13.5T 13.5	LP6_17.5T 17.5	LP6_21.5T 21.5
25.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27.50	88.590	1059.862	170.738	1370.734	604.025	657.179	-328.589
28.00	37.055	1018.205	164.331	1351.700	504.269	497.825	-422.104
30.00	Bad Gage	1723.860	816.820	1999.356	990.817	927.985	-190.108
36.10	Bad Gage	2023.522	1056.871	2125.020	1159.981	1077.815	85.387
36.20	Bad Gage	2220.074	1237.313	2229.741	1198.647	1126.148	186.886
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	17006.605

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP6_0.5T 0.5	RP6_4.5T 4.5	RP6_7.5T 7.5	RP6_9.5T 9.5	RP6_11.5T 11.5	RP6_15.5T 15.5	RP6_19.5T 19.5	RP6_23.5T 23.5
25.00	0.000	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
27.50	-4239.448	-842.413	410.737	Bad Gage	Bad Gage	744.159	-481.609	-1274.090
28.00	-4206.541	-898.985	370.549	Bad Gage	Bad Gage	710.488	-631.545	-1222.813
30.00	Bad Gage	-275.495	913.485	Bad Gage	Bad Gage	1702.916	-186.886	-1126.148
36.10	Bad Gage	-2978.895	Bad Gage	2899.952	Bad Gage	Bad Gage	-12013.855	53.166
36.20	Bad Gage	-2988.561	Bad Gage	3541.163	Bad Gage	Bad Gage	-11830.192	188.497
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	17736.427	17897.535

Table E37. Tabulated data for primary bar mat IL7 located in the intermediate and primary reinforced section (full bridge data).

Left Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)						
	LI7_2.5	LI7_6.5	LI7_8.5	LI7_10.5	LI7_13.5	LI7_17.5	LI7_21.5
	2.5	6.5	8.5	10.5	13.5	17.5	21.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.10	-114.408	-26.572	155.004	-22.882	1403.897	183.791	-74.550
36.10	Bad Gage	1513.138	614.113	687.186	398.583	471.656	Bad Gage
36.20	Bad Gage	803.809	755.093	1116.770	853.262	860.644	650.280
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of surcharge!

Right Bar Mat

Height of fill above bar mat IL1 (ft)	Measured Bar Force (lb)							
	RI7_0.5	RI7_4.5	RI7_7.5	RI7_9.5	RI7_11.5	RI7_15.5	RI7_19.5	RI7_23.5
	0.5	4.5	7.5	9.5	11.5	15.5	19.5	23.5
30.00	Bad Gage	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.10	Bad Gage	-86.360	-38.382	8.857	-39.858	-26.572	57.573	70.859
36.10	Bad Gage	Bad Gage	-1366.253	1079.864	688.663	741.807	485.681	433.274
36.20	Bad Gage	2626.956	-1565.545	1290.965	974.314	1193.534	879.097	690.877
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of surcharge!

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E38. Tabulated data for primary bar mat IL7 located in the intermediate and primary reinforced section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI7_2.5B 2.5	LI7_6.5B 6.5	LI7_8.5B 8.5	LI7_10.5B 10.5	LI7_13.5B 13.5	LI7_17.5B 17.5	LI7_21.5B 21.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.10	103.109	-91.832	-289.995	-35.444	96.665	107.943	-115.998
36.10	428.548	2632.512	243.274	362.494	647.656	596.101	757.210
36.20	434.993	1140.648	505.880	565.491	990.817	958.595	1219.591
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of surcharge!

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat IL1 (ft)	RI7_0.5B 0.5	RI7_4.5B 4.5	RI7_7.5B 7.5	RI7_9.5B 9.5	RI7_11.5B 11.5	RI7_15.5B 15.5	RI7_19.5B 19.5	RI7_23.5B 23.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.10	-107.943	-24.166	-69.277	-391.493	5870.791	-410.826	-32.222	4.833
36.10	5121.637	1203.480	-74.110	1752.860	Bad Gage	180.441	966.651	306.106
36.20	5234.413	1256.646	177.219	2049.299	Bad Gage	618.656	1445.143	657.322
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of surcharge!

Table E39. Tabulated data for primary bar mat IL7 located in the intermediate and primary reinforced section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat IL1 (ft)	LI7_2.5T 2.5	LI7_6.5T 6.5	LI7_8.5T 8.5	LI7_10.5T 10.5	LI7_13.5T 13.5	LI7_17.5T 17.5	LI7_21.5T 21.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.10	-314.161	130.498	86.999	-109.554	2875.785	-565.491	9.667
36.10	Bad Gage	225.552	969.873	1467.698	431.771	420.493	Bad Gage
36.20	Bad Gage	391.493	1304.978	1814.081	681.489	821.653	178.830
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of surcharge!

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat IL1 (ft)	RI7_0.5T 0.5	RI7_4.5T 4.5	RI7_7.5T 7.5	RI7_9.5T 9.5	RI7_11.5T 11.5	RI7_15.5T 15.5	RI7_19.5T 19.5	RI7_23.5T 23.5
30.00	Bad Gage	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
30.10	Bad Gage	-96.665	-286.773	260.996	Bad Gage	328.661	154.664	95.054
36.10	Bad Gage	-6107.620	-3046.560	512.325	Bad Gage	1403.254	72.499	528.436
36.20	Bad Gage	-5832.125	-3542.774	763.654	Bad Gage	1894.635	444.659	786.209
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of surcharge!

Table E40. Tabulated data for primary bar mat PL7 located in the primary reinforced only section (full bridge data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP7_2.5 2.5	LP7_6.5 6.5	LP7_8.5 8.5	LP7_10.5 10.5	LP7_13.5 13.5	LP7_17.5 17.5	LP7_21.5 21.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
36.10	Bad Gage	1030.410	205.934	888.692	854.739	702.687	343.962
36.20	Bad Gage	1164.748	617.803	1423.826	1308.680	1276.941	815.619
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of Surcharge

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP7_0.5 0.5	RP7_4.5 4.5	RP7_7.5 7.5	RP7_9.5 9.5	RP7_11.5 11.5	RP7_15.5 15.5	RP7_19.5 19.5	RP7_23.5 23.5
30.00	0.000	0.000	Bad Gage	Bad Gage	Bad Gage	0.000	0.000	0.000
36.10	66.430	1.55E+07	Bad Gage	Bad Gage	Bad Gage	845.881	Bad Gage	201.506
36.20	389.725	4381.459	Bad Gage	Bad Gage	Bad Gage	1235.607	23792.44	436.227
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of Surcharge

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E41. Tabulated data for primary bar mat PL7 located in the primary reinforced only section (half bridge bottom data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP7_2.5B 2.5	LP7_6.5B 6.5	LP7_8.5B 8.5	LP7_10.5B 10.5	LP7_13.5B 13.5	LP7_17.5B 17.5	LP7_21.5B 21.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
36.10	-188.456	-62.819	-25.772	980.936	2438.649	1533.418	642.682
36.20	2518.125	974.706	454.326	1391.977	2869.341	2129.853	1213.146
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of Surcharge

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP7_0.5B 0.5	RP7_4.5B 4.5	RP7_7.5B 7.5	RP7_9.5B 9.5	RP7_11.5B 11.5	RP7_15.5B 15.5	RP7_19.5B 19.5	RP7_23.5B 23.5
30.00	0.000	0.000	Bad Gage	Bad Gage	Bad Gage	0.000	0.000	0.000
36.10	2999.184	700.669	Bad Gage	Bad Gage	Bad Gage	1314.358	734.494	333.422
36.20	3127.115	1859.191	Bad Gage	Bad Gage	Bad Gage	1826.970	1319.478	555.824
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of Surcharge

Table E42. Tabulated data for primary bar mat PL7 located in the primary reinforced only section (half bridge top data).

Left Bar Mat

	Measured Bar Force (lb)						
Height of fill above bar mat PL1 (ft)	LP7_2.5T 2.5	LP7_6.5T 6.5	LP7_8.5T 8.5	LP7_10.5T 10.5	LP7_13.5T 13.5	LP7_17.5T 17.5	LP7_21.5T 21.5
30.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
36.10	Bad Gage	1050.198	452.616	845.635	-600.803	-82.147	141.744
36.20	Bad Gage	1454.809	894.152	1604.640	-146.609	449.493	565.491
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of Surcharge

Right Bar Mat

	Measured Bar Force (lb)							
Height of fill above bar mat PL1 (ft)	RP7_0.5T 0.5	RP7_4.5T 4.5	RP7_7.5T 7.5	RP7_9.5T 9.5	RP7_11.5T 11.5	RP7_15.5T 15.5	RP7_19.5T 19.5	RP7_23.5T 23.5
30.00	0.000	0.000	Bad Gage	0.000	Bad Gage	0.000	0.000	0.000
36.10	-2896.097	Bad Gage	Bad Gage	1430.331	Bad Gage	483.220	50256.471	62.819
36.20	-3011.116	4200.097	Bad Gage	1807.637	Bad Gage	898.985	49091.348	333.494
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Reinforcement removed with removal of Surcharge

Table E43. Tabulated data for intermediate bar mat IL1.5 located in the intermediate and primary reinforced section (full bridge data).

	Left Bar Mat			Right Bar Mat		
	Measured Bar Force (lb)			Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI1.5_0.5 0.5	LI1.5_3.5 3.5	LI1.5_7.5 7.5	RI1.5_1.5 1.5	RI1.5_5.5 5.5	RI1.5_9.5 9.5
2.00	0.000	0.000	Bad Gage	0.000	0.000	0.000
3.00	-230.292	Bad Gage	Bad Gage	-4144.154	-2450.177	997.933
4.00	Bad Gage	Bad Gage	Bad Gage	-3981.030	-2228.742	1167.700
5.00	Bad Gage	6560.378	Bad Gage	-3975.864	-2284.101	1254.060
8.50	Bad Gage	7966.490	Bad Gage	-3902.790	-2239.814	1291.704
10.00	Bad Gage	5253.912	Bad Gage	-3851.860	-2197.741	1285.061
12.50	Bad Gage	8398.288	Bad Gage	-3803.144	-2168.955	1228.226
15.00	Bad Gage	6737.526	Bad Gage	-3781.739	-2118.763	1196.487
18.00	Bad Gage	3968.851	Bad Gage	-3696.856	-2069.309	1192.058
20.00	Bad Gage	4192.501	Bad Gage	-1506.864	-2002.879	1165.486
22.50	Bad Gage	4279.598	Bad Gage	-2380.794	-1957.854	1147.771
25.00	Bad Gage	4360.791	Bad Gage	-3242.914	-1895.852	1136.699
27.50	Bad Gage	5342.486	Bad Gage	Bad Gage	-1842.707	1133.009
28.00	Bad Gage	5268.674	Bad Gage	Bad Gage	-1836.064	1114.556
30.00	Bad Gage	2905.226	Bad Gage	Bad Gage	-1768.158	1105.698
30.10	Bad Gage	2500.000	Bad Gage	Bad Gage	-1727.561	1105.698
36.10	Bad Gage	2333.924	Bad Gage	Bad Gage	-1635.297	1158.843
36.20	Bad Gage	2671.981	Bad Gage	Bad Gage	-1415.338	1214.201
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-3716.785	370.534

Table E44. Tabulated data for intermediate bar mat IL1.5 located in the intermediate and primary reinforced section (half bridge bottom data).

	Left Bar Mat			Right Bar Mat		
	Measured Bar Force (lb)			Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI1.5_0.5BB 0.5	LI1.5_3.5B 3.5	LI1.5_7.5B 7.5	RI1.5_1.5B 1.5	RI1.5_5.5B 5.5	RI1.5_9.5B 9.5
3.00	0.000	0.000	0.000	0.000	0.000	0.000
4.00	159.497	-202.997	101.498	1222.813	-249.718	497.825
5.00	-19.333	-362.494	106.332	1561.141	-425.326	652.489
8.50	-115.998	-260.996	111.165	1888.191	-420.493	768.487
10.00	-91.832	-304.495	96.665	2029.966	-401.160	768.487
10.00	-91.832	-304.495	96.665	2029.966	-401.160	768.487
12.50	-140.164	-360.883	56.388	2426.293	-372.160	758.821
15.00	-281.940	-362.494	20.944	2692.122	-294.828	745.932
18.00	-405.993	-333.494	-4.833	2859.675	-167.553	744.321
20.00	-1382.310	-328.661	-19.333	3218.946	-141.775	724.988
22.50	-251.329	-302.884	-30.611	3533.108	-144.998	720.155
25.00	Bad Gage	-230.385	-33.833	3819.881	-130.498	726.599
27.50	Bad Gage	-159.497	-27.388	4301.595	-53.166	745.932
28.00	Bad Gage	-173.997	-48.333	4440.148	-33.833	749.154
30.00	Bad Gage	-62.832	-66.054	4955.695	19.333	747.543
30.10	Bad Gage	-120.831	-38.666	Bad Gage	33.833	724.988
36.10	Bad Gage	-194.941	46.721	Bad Gage	125.665	840.986
36.20	Bad Gage	-114.387	14.500	Bad Gage	327.050	952.151
Final Grade	Bad Gage	7460.931	9679.394	Bad Gage	2547.124	Bad Gage

Table E45. Tabulated data for intermediate bar mat IL1.5 located in the intermediate and primary reinforced section (half bridge top data).

	Left Bar Mat			Right Bar Mat		
	Measured Bar Force (lb)			Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI1.5_0.5T 0.5	LI1.5_3.5T 3.5	LI1.5_7.5T 7.5	RI1.5_1.5T 1.5	RI1.5_5.5T 5.5	RI1.5_9.5T 9.5
3.00	0.000	Bad Gage	0.000	0.000	0.000	0.000
4.00	Bad Gage	Bad Gage	Bad Gage	-865.152	763.654	-57.999
5.00	Bad Gage	Bad Gage	19948.445	-1155.147	802.320	-67.666
8.50	Bad Gage	Bad Gage	-4422.426	-1343.644	908.652	-62.832
10.00	Bad Gage	Bad Gage	-6549.058	-1353.311	942.484	-91.832
12.50	Bad Gage	Bad Gage	Bad Gage	-1652.972	995.650	-183.664
15.00	Bad Gage	Bad Gage	Bad Gage	-1855.969	1058.482	-227.163
18.00	Bad Gage	Bad Gage	Bad Gage	-1839.858	1172.869	-270.662
20.00	Bad Gage	Bad Gage	5848.236	2626.067	1227.646	-328.661
22.50	Bad Gage	Bad Gage	7087.160	845.819	1251.812	-367.327
27.50	Bad Gage	Bad Gage	12793.620	Bad Gage	1338.811	-376.994
28.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	1406.477	-433.382
30.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	1416.143	-449.493
30.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	1478.975	-483.325
36.10	Bad Gage	Bad Gage	Bad Gage	Bad Gage	1546.641	-425.326
36.20	Bad Gage	Bad Gage	-6935.718	Bad Gage	1701.305	-439.826
Final Grade	Bad Gage	Bad Gage	29102.626	Bad Gage	7970.034	7278.879

Table E46. Tabulated data for intermediate bar mat IL2.5 located in the intermediate and primary reinforced section (full bridge data).

	Left Bar Mat Measured Bar Force (lb)			Right Bar Mat Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI2.5_2.5 2.5	LI2.5_5.5 5.5	LI2.5_9.5 9.5	RI2.5_0.5 0.5	RI2.5_3.5 3.5	RI2.5_7.5 7.5
10.00	0.000	Bad Gage	0.000	0.000	0.000	Bad Gage
12.50	19.929	Bad Gage	0.738	19.929	28.787	Bad Gage
15.00	110.717	Bad Gage	47.978	46.501	78.978	Bad Gage
18.00	101.860	Bad Gage	51.668	19.929	67.169	Bad Gage
20.00	117.360	Bad Gage	88.574	24.358	152.790	Bad Gage
22.50	117.360	Bad Gage	97.431	-458.370	166.076	Bad Gage
25.00	124.004	Bad Gage	88.574	Bad Gage	137.290	Bad Gage
27.50	181.577	Bad Gage	97.431	Bad Gage	137.290	Bad Gage
30.00	163.862	Bad Gage	93.741	Bad Gage	174.934	Bad Gage
30.10	128.432	Bad Gage	104.074	Bad Gage	Bad Gage	Bad Gage
36.10	261.293	Bad Gage	84.145	Bad Gage	197.077	Bad Gage
36.20	98.908	Bad Gage	49.454	Bad Gage	293.770	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E47. Tabulated data for intermediate bar mat IL2.5 located in the intermediate and primary reinforced section (half bridge bottom data).

	Left Bar Mat Measured Bar Force (lb)			Right Bar Mat Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI2.5B_2.5B 2.5	LI2.5B_5.5B 5.5	LI2.5B_9.5B 9.5	RI2.5B_0.5B 0.5	RI2.5B_3.5B 3.5	RI2.5B_7.5B 7.5
10.00	0.000	0.000	0.000	0.000	0.000	0.000
12.50	362.494	64.443	33.833	120.831	19.333	3.222
15.00	507.492	180.441	37.055	72.499	43.499	25.777
18.00	610.601	194.941	70.888	122.442	153.053	45.110
20.00	811.986	262.607	77.332	91.832	112.776	59.610
22.50	865.152	277.106	88.610	98.276	130.498	78.943
25.00	926.373	214.274	78.943	101.498	125.665	74.110
27.50	2005.800	259.385	82.165	103.109	159.497	101.498
28.00	2458.515	349.605	111.165	96.665	188.497	112.776
30.00	3844.047	370.549	78.943	146.609	222.330	119.220
30.10	3919.768	528.436	127.276	140.164	230.385	135.331
36.10	4770.420	600.934	43.499	154.664	341.550	130.498
36.20	5427.743	702.433	-6.444	188.497	376.994	83.776
Final Grade	Bad Gage	588.046	-11788.304	Bad Gage	22381.183	Bad Gage

Table E48. Tabulated data for intermediate bar mat IL2.5 located in the intermediate and primary reinforced section (half bridge top data).

	Left Bar Mat Measured Bar Force (lb)			Right Bar Mat Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI2.5_2.5T 2.5	LI2.5_5.5T 5.5	LI2.5_9.5T 9.5	RI2.5_0.5T 0.5	RI2.5_3.5T 3.5	RI2.5_7.5T 7.5
10.00	0.000	Bad Gage	0.000	0.000	0.000	Bad Gage
12.50	409.215	Bad Gage	19.333	144.998	62.832	Bad Gage
15.00	752.376	Bad Gage	69.277	154.664	188.497	Bad Gage
18.00	873.208	Bad Gage	72.499	101.498	178.830	Bad Gage
20.00	1055.260	Bad Gage	106.332	115.998	307.717	Bad Gage
22.50	1119.704	Bad Gage	101.498	-1739.971	364.105	Bad Gage
27.50	2390.849	Bad Gage	111.165	Bad Gage	517.158	Bad Gage
28.00	2830.675	Bad Gage	130.498	Bad Gage	546.158	Bad Gage
30.00	4201.708	Bad Gage	115.998	Bad Gage	679.878	Bad Gage
30.10	4496.536	Bad Gage	82.165	Bad Gage	821.653	Bad Gage
36.10	5285.967	Bad Gage	75.721	Bad Gage	968.262	Bad Gage
36.20	6049.621	Bad Gage	230.385	Bad Gage	1032.705	Bad Gage
Final Grade	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage	Bad Gage

Table E49. Tabulated data for intermediate bar mat IL3.5 located in the intermediate and primary reinforced section (full bridge data).

	Left Bar Mat Measured Bar Force (lb)				Right Bar Mat Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI3.5_0.5 0.5	LI3.5_4.5 4.5	LI3.5_6.5 6.5	LI3.5_9.5 9.5	RI3.5_2.5 2.5	RI3.5_6.5 6.5	RI3.5_8.5 8.5
12.00	0.000	Bad Gage	0.000	Bad Gage	0.000	0.000	0.000
15.00	104.074	Bad Gage	511.515	Bad Gage	192.648	1527.901	389.725
18.00	33.215	Bad Gage	679.067	Bad Gage	170.505	1437.112	560.230
20.00	28.787	Bad Gage	810.452	Bad Gage	261.293	1512.400	564.659
22.50	-6.643	Bad Gage	907.883	Bad Gage	343.224	1574.402	555.802
25.00	-68.645	Bad Gage	959.551	Bad Gage	387.511	1530.115	597.874
27.50	-13.286	Bad Gage	989.814	Bad Gage	538.087	1623.118	445.084
28.00	37.644	Bad Gage	997.195	Bad Gage	589.755	1778.122	353.558
30.00	70.859	Bad Gage	1073.959	Bad Gage	671.686	1833.481	334.367
30.10	128.432	Bad Gage	996.457	Bad Gage	717.449	2233.540	194.863
36.10	137.290	Bad Gage	1020.815	Bad Gage	811.190	2471.213	159.433
36.20	124.742	Bad Gage	1069.531	Bad Gage	899.026	2266.017	137.290
Final Grade	-2922.941	Bad Gage	1574.402	Bad Gage	-2192.205	Bad Gage	Bad Gage

Note: Highlighted gages show data plotted in the body of the report and in Appendix C and Appendix D.

Table E50. Tabulated data for intermediate bar mat IL3.5 located in the intermediate and primary reinforced section (half bridge bottom data).

	Left Bar Mat				Right Bar Mat		
	Measured Bar Force (lb)				Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI3.5_0.5B 0.5	LI3.5_4.5B 4.5	LI3.5_6.5B 6.5	LI3.5_9.5B 9.5	RI3.5_2.5B 2.5	RI3.5_6.5B 6.5	RI3.5_8.5B 8.5
12.00	0.000	0.000	0.000	Bad Gage	0.000	0.000	0.000
15.00	109.554	193.330	768.487	Bad Gage	683.100	683.100	-3354.277
18.00	29.000	37.055	976.317	Bad Gage	911.874	911.874	-3217.335
20.00	49.944	74.110	1174.480	Bad Gage	994.039	994.039	-3198.002
22.50	222.330	202.997	1372.644	Bad Gage	1011.761	1011.761	-3363.944
25.00	352.827	328.661	1454.809	Bad Gage	1006.928	1006.928	-3338.167
27.50	336.717	396.327	1498.308	Bad Gage	837.764	837.764	-3400.999
28.00	318.995	404.382	1562.752	Bad Gage	753.987	753.987	-3468.664
30.00	301.273	507.492	1619.140	Bad Gage	716.932	716.932	-3557.274
30.10	222.330	444.659	1652.972	Bad Gage	649.267	649.267	-3777.993
36.20	285.162	530.047	1793.137	Bad Gage	362.494	362.494	-3054.616
Final Grade	23574.996	7978.089	20791.042	Bad Gage	4850.975	4850.975	-3939.101

Table E51. Tabulated data for intermediate bar mat IL3.5 located in the intermediate and primary reinforced section (half bridge top data).

	Left Bar Mat				Right Bar Mat		
	Measured Bar Force (lb)				Measured Bar Force (lb)		
Height of fill above bar mat IL1 (ft)	LI3.5_0.5T 0.5	LI3.5_4.5T 4.5	LI3.5_6.5T 6.5	LI3.5_9.5T 9.5	RI3.5_2.5T 2.5	RI3.5_6.5T 6.5	RI3.5_8.5T 8.5
12.00	0.000	Bad Gage	0.000	Bad Gage	0.000	0.000	0.000
15.00	Bad Gage	Bad Gage	Bad Gage	Bad Gage	-1324.311	-1324.311	409.215
18.00	-115.998	Bad Gage	347.994	Bad Gage	-1556.307	-1556.307	153.053
20.00	-91.832	Bad Gage	468.826	Bad Gage	-1744.804	-1744.804	302.884
22.50	-164.331	Bad Gage	555.824	Bad Gage	-2034.799	-2034.799	209.441
25.00	-190.108	Bad Gage	602.546	Bad Gage	-2232.963	-2232.963	56.388
27.50	-275.495	Bad Gage	662.156	Bad Gage	-2495.570	-2495.570	-83.776
28.00	-367.327	Bad Gage	662.156	Bad Gage	-2522.958	-2522.958	-293.217
30.00	-439.826	Bad Gage	715.321	Bad Gage	-2643.789	-2643.789	-370.549
30.10	-517.158	Bad Gage	486.547	Bad Gage	-2667.956	-2667.956	-1055.260
36.10	-521.991	Bad Gage	457.548	Bad Gage	-2769.454	-2769.454	-1715.805
36.20	-546.158	Bad Gage	531.658	Bad Gage	-2822.620	-2822.620	-1786.692
Final Grade	-3642.662	Bad Gage	4419.204	Bad Gage	4820.364	Bad Gage	3.38E+07

Appendix F

Table F1. Tabulated data for back calculated lateral earth pressure coefficient K located in the instrumented section of wall with primary and intermediate reinforcement.

Mat IL1	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	0.2546
-3	0.1697
-4	1.2457
-5	1.6148
-10	1.6439
-12	1.6993
-15	1.5421
-18	1.3625
-20	1.2639
-22.5	1.1595
-25	1.0693
-27.5	0.9827
-28	1.0075
-30	0.9747
-30	1.0041
-36	0.8607
-37	0.9886

Mat IL2	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	0.5916
-5	2.6962
-7	2.0464
-10	1.4907
-13	1.1825
-15	1.0488
-18	0.8998
-20	0.8283
-22.5	0.7466
-23	0.7358
-25	0.6929
-25	0.7080
-31	0.5497
-32	0.5719

Mat IL2.5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	0.0818
-4	0.1136
-7	0.0597
-9	0.0535
-12	0.0401
-14	0.0363
-16.5	0.0451
-17	0.0430
-19	0.0354
-19	0.0277
-25	0.0429

Mat IL3	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	2.1124
-3	0.9951
-5	0.7891
-8	0.5885
-10	0.5133
-12	0.4568
-13	0.4391
-15	0.4221
-15	0.4306
-21	0.3406

Mat IL3.5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	2.0985
-2	1.3930
-4	0.8312
-7	0.5321
-10	0.3937
-12	0.3384
-13	0.3147
-15	0.2937
-15	0.2725
-21	0.1994

Mat IL4	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-3	0.4588
-5	0.8421
-7	0.8059
-10	0.6418
-12	0.5659
-13	0.5210
-15	0.5096
-15	0.5081
-21	0.3999

Mat IL5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-3	0.9539
-5	0.9330
-7	0.7170
-8	0.6189
-10	0.5646
-10	0.5305
-16	0.3333

Mat IL6	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	1.6731
-3	1.3324
-5	1.4426
-5	1.7836
-11	1.0544
-11	1.1543

Mat IL7	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	0.0363
-6	0.7384
-8	0.6620

Table F2. Tabulated data for back calculated lateral earth pressure coefficient K located in the instrumented section of wall with primary reinforcement only.

Mat PL1	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	0.9056
-2	0.9056
-3	0.8001
-4	0.6383
-5	0.6067
-8.5	0.4082
-10	0.3601
-12.5	0.3369
-15	0.2813
-18	0.2582
-20	0.2430
-22.5	0.2215
-25	0.2112
-27.5	0.1994
-28	0.2024
-30	0.2126

Mat PL2	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	0.6634
-2	2.3306
-3	1.4374
-4	1.0824
-5	0.9229
-8.5	0.5504
-10	0.4743
-12.5	0.3897
-15	0.3224
-18	0.2677
-20	0.2488
-22.5	0.2139

Mat PL3	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-6	0.6042
-8	0.5310
-10.5	0.4556
-13	0.3814
-15.5	0.3199
-16	0.3113
-18	0.2832
-24	0.2866
-26	0.2155

Mat PL4	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-3	0.8388
-5	0.9948
-7.5	0.8497
-10	0.7249
-12.5	0.6159
-13	0.6182
-15	0.5750

Mat PL5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2.5	0.9466
-5	0.9048
-7.5	0.7122
-8	0.7103
-10	0.6727
-16	0.4738
-18	0.4403

Mat PL6	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2.5	0.6904
-3	0.5754
-5	0.9060
-11	0.4950
-12	0.5358

Mat PL7	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-6	0.6077
-8	0.7302

Table F3. Tabulated data for normalized lateral earth pressure coefficient K located in the instrumented section of wall with primary and intermediate reinforcement.

Mat IL1	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	1.0184
-3	0.6789
-4	4.9827
-5	6.4594
-10	6.5757
-12	6.7972
-15	6.1684
-18	5.4501
-20	5.0555
-22.5	4.6381
-25	4.2771
-27.5	3.9306
-28	4.0302
-30	3.8989
-30	4.0164
-36	3.4429
-37	3.9545

Mat IL2	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	2.3665
-5	10.7850
-7	8.1857
-10	5.9628
-13	4.7300
-15	4.1950
-18	3.5993
-20	3.3131
-22.5	2.9863
-23	2.9434
-25	2.7715
-25	2.8320
-31	2.1988
-32	2.2876

Mat IL2.5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	0.3270
-4	0.4542
-7	0.2388
-9	0.2140
-12	0.1605
-14	0.1454
-16.5	0.1806
-17	0.1718
-19	0.1415
-19	0.1109
-25	0.1715

Mat IL3	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	8.4495
-3	3.9804
-5	3.1564
-8	2.3539
-10	2.0530
-12	1.8272
-13	1.7565
-15	1.6884
-15	1.7225
-21	1.3623

Mat IL3.5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	8.3941
-2	5.5718
-4	3.3249
-7	2.1284
-10	1.5746
-12	1.3536
-13	1.2588
-15	1.1749
-15	1.0901
-21	0.7977

Mat IL4	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-3	1.8351
-5	3.3685
-7	3.2237
-10	2.5673
-12	2.2636
-13	2.0838
-15	2.0386
-15	2.0325
-21	1.5997

Mat IL5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-3	3.8155
-5	3.7319
-7	2.8681
-8	2.4755
-10	2.2584
-10	2.1221
-16	1.3332

Mat IL6	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	6.6923
-3	5.3296
-5	5.7705
-5	7.1344
-11	4.2174
-11	4.6171

Mat IL7	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-1	0.1454
-6	2.9535
-8	2.6481

Table F4. Tabulated data for normalized lateral earth pressure coefficient K located in the instrumented section of wall with primary reinforcement only.

Mat PL1	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	3.6225
-2	3.6225
-3	3.2006
-4	2.5532
-5	2.4266
-8.5	1.6328
-10	1.4403
-12.5	1.3477
-15	1.1251
-18	1.0329
-20	0.9718
-22.5	0.8858
-25	0.8450
-27.5	0.7978
-28	0.8095
-30	0.8506

Mat PL2	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2	2.6536
-2	9.3224
-3	5.7494
-4	4.3295
-5	3.6917
-8.5	2.2017
-10	1.8971
-12.5	1.5586
-15	1.2895
-18	1.0707
-20	0.9951
-22.5	0.8556

Mat PL3	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-6	2.4169
-8	2.1240
-10.5	1.8223
-13	1.5255
-15.5	1.2795
-16	1.2453
-18	1.1328
-24	1.1464
-26	0.8621

Mat PL4	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-3	3.3552
-5	3.9790
-7.5	3.3988
-10	2.8998
-12.5	2.4637
-13	2.4729
-15	2.3002

Mat PL5	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2.5	3.7864
-5	3.6193
-7.5	2.8489
-8	2.8412
-10	2.6908
-16	1.8953
-18	1.7614

Mat PL6	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-2.5	2.7617
-3	2.3014
-5	3.6241
-11	1.9799
-12	2.1432

Mat PL7	
Depth from top of wall (ft)	Lateral Earth Pressure Coefficient K
-6	2.4306
-8	2.9207

Appendix G

Table G1. Tabulated data for primary fascia bar mat IF1 located in the intermediate and primary reinforced section (full bridge data).

	Measured Bar Force (lb)			
Height of fill above bar mat IL1 (ft)	IF1_2	IF1_1	IF1_4	IF1_3
0.00	0.000	0.000	0.000	Bad Gage
2.00	-1344.110	11755.979	1.55E+07	Bad Gage
2.00	-63.478	-12.548	4471.509	Bad Gage
2.00	-59.787	-13.286	4468.556	Bad Gage
3.00	-66.430	130.647	4532.772	Bad Gage
4.00	-163.862	37.644	4402.864	Bad Gage
5.00	-95.217	130.647	4608.798	Bad Gage
8.50	-239.150	-22.882	4345.291	Bad Gage
10.00	-314.438	-101.860	4241.216	Bad Gage
12.50	-371.273	-156.481	4057.425	Bad Gage
15.00	-294.508	146.147	3996.900	Bad Gage
18.00	-349.129	102.598	3889.873	Bad Gage
20.00	-378.654	95.217	3917.921	Bad Gage
22.50	-436.227	108.503	4011.662	Bad Gage
25.00	-484.204	105.551	3944.494	Bad Gage
27.50	-554.325	84.145	3889.135	Bad Gage
28.00	-636.256	-307.795	1052.554	Bad Gage
30.00	-687.186	Bad Gage	3686.153	Bad Gage
30.10	-690.877	Bad Gage	3675.081	Bad Gage
36.10	-651.019	Bad Gage	3596.841	Bad Gage
36.20	-841.453	Bad Gage	3528.196	Bad Gage
Final Grade	2339.091	-2767.936	Bad Gage	Bad Gage

Table G2. Tabulated data for primary fascia bar mat IF1 located in the intermediate and primary reinforced section (half bridge bottom data).

	Measured Bar Force (lb)			
Height of fill above bar mat IL1 (ft)	IF1_2B	IF1_1B	IF1_4B	IF1_3B
3.00	0.000	0.000	0.000	0.000
4.00	-1851.136	473.659	-396.327	-294.828
5.00	-1825.358	542.935	128.887	198.163
8.50	-2347.350	613.823	-2513.291	-293.217
10.00	-2571.290	507.492	-2183.019	1536.974
12.50	-3410.665	666.989	-2566.457	2097.632
15.00	-4053.488	1000.483	-2848.397	1822.136
18.00	-4490.092	966.651	-3032.061	1988.078
20.00	-5604.962	908.652	-3022.394	1617.529
22.50	-6486.225	879.652	-2861.286	1643.306
25.00	-7180.603	879.652	-3030.449	1565.974
27.50	-8340.583	811.986	-3167.392	1498.308
28.00	-8732.077	-185.275	-3189.947	1296.923
30.00	-9315.289	Bad Gage	-3871.435	1116.481
30.10	-9471.564	Bad Gage	-3639.439	874.819
36.10	-9809.892	Bad Gage	-4122.765	301.273
36.20	-9980.667	Bad Gage	-4427.260	426.937
Final Grade	23020.783	Bad Gage	-7365.877	9092.960

Table G3. Tabulated data for primary fascia bar mat IF1 located in the intermediate and primary reinforced section (half bridge top data).

	Measured Bar Force (lb)			
Height of fill above bar mat IL1 (ft)	IF1_2T	IF1_1T	IF1_4T	IF1_3T
3.00	0.000	0.000	0.000	Bad Gage
4.00	1633.639	-625.101	103.109	Bad Gage
5.00	1786.692	-654.100	56.388	Bad Gage
8.50	1962.301	-953.762	2089.576	Bad Gage
10.00	2038.022	-1048.816	1528.919	Bad Gage
12.50	2714.677	-1398.421	1493.475	Bad Gage
15.00	3526.663	-969.873	1698.083	Bad Gage
18.00	3943.934	-1034.316	1710.971	Bad Gage
20.00	4934.751	-1043.983	1701.305	Bad Gage
22.50	5672.628	-1014.983	1710.971	Bad Gage
27.50	7307.878	-948.929	1725.471	Bad Gage
28.00	7646.206	-955.373	1788.304	Bad Gage
30.00	7947.479	-704.044	1983.245	Bad Gage
30.10	8155.309	-668.600	2062.188	Bad Gage
36.10	8376.027	-634.767	1973.578	Bad Gage
36.20	8203.641	-368.938	2516.514	Bad Gage
Final Grade	-6218.785	Bad Gage	Bad Gage	Bad Gage

Table G4. Tabulated data for primary fascia bar mat PF1 located in the primary reinforced only section (full bridge data).

	Measured Bar Force (lb)			
Height of fill above bar mat PL1 (ft)	PF1_2	PF1_1	PF1_4	PF1_3
0.00	0.000	0.000	0.000	0.000
2.00	17.715	-65.692	2106.584	619.280
3.00	56.835	-163.862	2271.184	768.379
4.00	-101.122	-310.747	2122.084	569.088
5.00	19.191	-91.526	2379.687	943.313
8.50	-135.813	-193.386	2089.607	728.521
10.00	-186.743	-226.602	2015.058	870.239
12.50	-363.891	-518.896	1768.527	799.380
18.00	-402.273	-793.475	1524.948	886.478
20.00	-383.820	-844.405	1468.113	947.741
22.50	-341.748	-825.952	1385.444	1078.388
25.00	-332.890	-831.119	1283.584	1226.011
27.50	-231.030	-715.973	1270.298	1433.422
28.00	-153.528	-432.536	1294.656	1499.852
30.00	-80.455	-270.889	1327.871	1516.829
36.10	-25.096	-353.558	1147.033	507.824
36.10	29.525	11.072	1431.208	738.116
36.20	60.526	14.024	1435.636	727.045
Final Grade	Bad Gage	-17281.518	Bad Gage	1518.305

Table G5. Tabulated data for primary fascia bar mat PF1 located in the primary reinforced only section (half bridge bottom data).

	Measured Bar Force (lb)			
Height of fill above bar mat PL1 (ft)	PF1_2B	PF1_1B	PF1_4B	PF1_3B
3.00	0.000	0.000	0.000	0.000
4.00	839.375	1519.252	236.829	492.992
6.00	2213.630	-481.714	911.874	12.889
8.50	3072.338	-950.540	2500.403	2514.903
10.00	3349.444	-1085.871	2563.235	2484.292
12.50	5384.244	-1172.869	3170.614	3015.950
18.00	5174.803	70.888	4080.876	3972.934
20.00	4767.198	-273.884	4042.210	3882.713
22.50	4494.925	-533.269	4171.097	3713.549
25.00	4243.596	-960.206	4366.038	3444.498
27.50	3702.272	-1350.089	4222.652	3185.114
28.00	3338.167	-628.323	4148.542	3077.171
30.00	3073.949	-1591.751	4037.377	3202.836
36.10	2933.784	280.329	3893.991	6753.665
36.20	1905.913	618.656	3729.660	5567.907
Final Grade	-6122.120	Bad Gage	-5709.683	Bad Gage

Table G6. Tabulated data for primary fascia bar mat PF1 located in the primary reinforced only section (half bridge top data).

	Measured Bar Force (lb)			
Height of fill above bar mat PL1 (ft)	PF1_2T	PF1_1T	PF1_4T	PF1_3T
3.00	0.000	0.000	0.000	0.000
4.00	120.831	-1240.535	-104.720	51.555
5.00	1780.248	497.825	1108.426	-77.332
8.50	2319.961	1034.316	2055.744	2319.961
10.00	2506.847	1222.813	1967.134	2672.789
12.50	4129.209	2031.577	2034.799	2914.451
18.00	3795.715	1425.810	2397.293	3910.101
20.00	3471.887	1849.525	2257.129	4093.765
22.50	3268.890	2097.632	2192.686	4190.430
25.00	3032.061	2435.959	2194.297	4345.094
27.50	2746.899	2590.623	2015.466	4504.592
28.00	2519.736	1275.979	1981.634	4499.758
30.00	2419.849	1883.357	1923.635	4659.256
36.10	2672.789	1014.983	2070.243	3779.604
36.20	1263.090	1406.477	1652.972	3539.552
Final Grade	4121.154	-2261.962	Bad Gage	7921.701

Table G7. Tabulated data for primary fascia bar mat IF2 located in the intermediate and primary reinforced section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF2_2	IF2_1
8.50	Bad Gage	Bad Gage
10.00	Bad Gage	Bad Gage
12.50	Bad Gage	Bad Gage
15.00	Bad Gage	Bad Gage
18.00	Bad Gage	Bad Gage
20.00	Bad Gage	Bad Gage
22.50	Bad Gage	Bad Gage
25.00	Bad Gage	Bad Gage
27.50	Bad Gage	Bad Gage
28.00	Bad Gage	Bad Gage
30.00	Bad Gage	Bad Gage
30.10	Bad Gage	Bad Gage
36.10	Bad Gage	Bad Gage
36.20	Bad Gage	Bad Gage
Final Grade	Bad Gage	Bad Gage

Table G8. Tabulated data for primary fascia bar mat IF2 located in the intermediate and primary reinforced section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF2_2B	IF2_1B
8.50	Bad Gage	0.000
10.00	Bad Gage	120.831
12.50	Bad Gage	559.046
15.00	Bad Gage	861.930
18.00	Bad Gage	871.597
20.00	Bad Gage	736.266
22.50	Bad Gage	657.322
25.00	Bad Gage	521.991
27.50	Bad Gage	246.496
28.00	Bad Gage	188.497
30.00	Bad Gage	227.163
30.10	Bad Gage	90.221
36.10	Bad Gage	38.666
36.20	Bad Gage	149.831
Final Grade	Bad Gage	19669.728

Table G9. Tabulated data for primary fascia bar mat IF2 located in the intermediate and primary reinforced section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF2_2T	IF2_1T
8.50	0.000	Bad Gage
10.00	260.996	Bad Gage
12.50	2187.852	Bad Gage
15.00	2426.293	Bad Gage
18.00	2365.072	Bad Gage
20.00	2302.239	Bad Gage
22.50	2110.520	Bad Gage
27.50	2005.800	Bad Gage
28.00	2055.744	Bad Gage
30.00	2089.576	Bad Gage
30.10	2142.742	Bad Gage
36.10	2108.909	Bad Gage
36.20	2157.242	Bad Gage
Final Grade	-3544.385	Bad Gage

Table G10. Tabulated data for primary fascia bar mat PF2 located in the primary reinforced only section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF2_2	PF2_1
8.50	Bad Gage	0.000
10.00	Bad Gage	59.787
12.50	Bad Gage	287.865
18.00	Bad Gage	343.224
20.00	Bad Gage	396.368
22.50	Bad Gage	416.298
25.00	Bad Gage	462.799
27.50	Bad Gage	562.445
28.00	Bad Gage	566.135
30.00	Bad Gage	584.588
36.10	Bad Gage	535.872
36.20	Bad Gage	582.374
Final Grade	Bad Gage	785.356

Table G11. Tabulated data for primary fascia bar mat PF2 located in the primary reinforced only section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF2_2B	PF2_1B
8.50	0.000	0.000
10.00	583.213	32.222
12.50	2827.453	1528.919
18.00	3552.441	2058.966
20.00	3881.102	1986.467
20.00	3881.102	1981.634
22.50	4082.488	1949.412
25.00	4256.485	2000.967
27.50	4388.594	2097.632
28.00	4345.094	2102.465
30.00	4477.203	2113.743
36.10	4232.318	1954.245
36.20	4043.821	2026.744
Final Grade	11008.539	9165.458

Table G12. Tabulated data for primary fascia bar mat PF2 located in the primary reinforced only section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF2_2T	PF2_1T
8.50	Bad Gage	0.000
10.00	Bad Gage	130.498
12.50	Bad Gage	992.428
18.00	Bad Gage	1478.975
20.00	Bad Gage	1259.868
22.50	Bad Gage	1145.481
25.00	Bad Gage	1039.149
27.50	Bad Gage	927.985
28.00	Bad Gage	976.317
30.00	Bad Gage	929.596
36.10	Bad Gage	1002.094
36.20	Bad Gage	1076.204
Final Grade	Bad Gage	-6487.836

Table G13. Tabulated data for primary fascia bar mat IF3 located in the intermediate and primary reinforced section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF3_2	IF3_1
12.00	0.000	0.000
15.00	1020.077	-672.424
18.00	739.593	-699.734
20.00	-534.396	-755.093
22.50	-558.754	-885.740
25.00	-373.487	-970.623
27.50	-45.763	-1000.886
28.00	-5.167	-1006.791
30.00	160.909	-1199.439
30.10	110.717	-1181.724
36.10	137.290	-1166.224
36.20	293.032	-942.575
Final Grade	1397.254	1460.732

Table G14. Tabulated data for primary fascia bar mat IF3 located in the intermediate and primary reinforced section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF3_2B	IF3_1B
12.00	0.000	0.000
15.00	-1888.191	-165.942
18.00	-2102.465	95.054
20.00	-4084.099	-1382.310
22.50	-3931.046	-1493.475
25.00	-3568.552	-1532.141
27.50	-2785.565	-1438.698
28.00	-2688.900	-1449.976
30.00	-2234.574	-1590.140
30.10	-2258.740	-1527.308
36.10	-2321.572	-1512.808
36.20	-2324.795	-1296.923
Final Grade	5566.296	7317.545

Table G15. Tabulated data for primary fascia bar mat IF3 located in the intermediate and primary reinforced section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF3_2T	IF3_1T
12.00	0.000	0.000
15.00	-328.661	662.156
15.00	4064.766	-333.494
18.00	3718.382	-650.878
20.00	2811.342	655.711
22.50	2677.622	507.492
27.50	2672.789	222.330
28.00	2653.456	193.330
30.00	2566.457	-48.333
30.10	2532.624	-106.332
36.10	2600.290	-164.331
36.20	2469.792	48.333
Final Grade	8305.139	8250.362

Table G16. Tabulated data for primary fascia bar mat PF3 located in the primary reinforced only section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF3_2	PF3_1
12.00	0.000	0.000
18.00	-24.358	228.078
20.00	-201.506	Bad Gage
22.50	-356.510	Bad Gage
25.00	-460.585	Bad Gage
27.50	-396.368	-15589.017
28.00	-387.511	Bad Gage
30.00	-372.011	Bad Gage
36.10	-357.986	Bad Gage
36.20	-336.581	Bad Gage
Final Grade	-514.467	Bad Gage

Table G17. Tabulated data for primary fascia bar mat PF3 located in the primary reinforced only section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF3_2B	PF3_1B
12.00	0.000	0.000
18.00	3202.836	-446.270
20.00	3011.116	-41981.634
22.50	3446.109	Bad Gage
25.00	3736.104	Bad Gage
27.50	3578.218	-32416.626
28.00	3529.886	Bad Gage
30.00	3641.050	Bad Gage
36.10	3525.052	Bad Gage
36.20	3600.773	Bad Gage
Final Grade	-4019.655	Bad Gage

Table G18. Tabulated data for primary fascia bar mat PF3 located in the primary reinforced only section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF3_2T	PF3_1T
12.00	0.000	0.000
18.00	2959.562	35.444
20.00	2553.569	-824.875
22.50	2630.901	-135.331
25.00	2737.232	164.331
27.50	2701.788	-29.000
28.00	2664.733	-43.499
30.00	2790.398	-1469.309
36.10	2724.343	-1561.141
36.20	2672.789	-1580.474
Final Grade	4952.473	-12945.062

Table G19. Tabulated data for primary fascia bar mat IF4 located in the intermediate and primary reinforced section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF4_2	IF4_1
15.00	0.000	Bad Gage
18.00	14.024	Bad Gage
20.00	15.500	Bad Gage
22.50	-50.930	Bad Gage
25.00	-217.006	Bad Gage
27.50	-310.747	Bad Gage
28.00	-298.937	Bad Gage
30.00	-542.516	Bad Gage
30.10	-520.372	Bad Gage
36.10	-558.754	Bad Gage
36.20	-220.697	Bad Gage
Final Grade	527.753	Bad Gage

Table G20. Tabulated data for primary fascia bar mat IF4 located in the intermediate and primary reinforced section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF4_2B	IF4_1B
15.00	0.000	0.000
18.00	169.164	91.832
20.00	246.496	178.830
22.50	-3214.113	-328.661
25.00	-1498.308	-1696.472
27.50	-1764.137	-1232.479
28.00	-1762.526	-1266.312
30.00	-2727.566	-1222.813
30.10	-2456.903	-1048.816
36.10	-2550.346	-560.657
36.20	-2321.572	-422.104
Final Grade	6674.722	9208.958

Table G21. Tabulated data for primary fascia bar mat IF4 located in the intermediate and primary reinforced section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF4_2T	IF4_1T
15.00	0.000	Bad Gage
18.00	-141.775	Bad Gage
20.00	-206.219	Bad Gage
22.50	3075.560	Bad Gage
25.00	1005.317	Bad Gage
27.50	1064.927	Bad Gage
28.00	1055.260	Bad Gage
30.00	1496.697	Bad Gage
30.10	1314.645	Bad Gage
36.10	1292.090	Bad Gage
36.20	1345.255	Bad Gage
Final Grade	9318.511	Bad Gage

Table G22. Tabulated data for primary fascia bar mat PF4 located in the primary reinforced only section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF4_2	PF4_1
18.00	0.000	0.000
20.00	-58.311	-2.214
22.50	-203.720	-29.525
25.00	-380.868	-147.623
27.50	-422.203	-232.507
28.00	-442.870	-262.769
30.00	-428.846	-373.487
36.10	-442.870	-560.230
36.20	-405.226	-515.943
Final Grade	Bad Gage	419.250

Table G23. Tabulated data for primary fascia bar mat PF4 located in the primary reinforced only section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF4_2B	PF4_1B
18.00	0.000	0.000
25.00	3019.172	779.765
27.50	3014.339	-127.276
28.00	3030.449	-175.608
30.00	3320.445	-93.443
36.10	3198.002	-6.444
36.20	3507.330	-93.443
Final Grade	Bad Gage	7369.099

Table G24. Tabulated data for primary fascia bar mat PF4 located in the primary reinforced only section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF4_2T	PF4_1T
18.00	0.000	0.000
20.00	409.215	164.331
22.50	3122.281	-568.713
25.00	2379.571	-521.991
27.50	2273.240	338.328
28.00	2239.407	357.661
30.00	2550.346	697.599
36.10	2456.903	1237.313
36.20	2542.291	1159.981
Final Grade	Bad Gage	-12587.401

Table G25. Tabulated data for primary fascia bar mat IF5 located in the intermediate and primary reinforced section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF5_2	IF5_1
22.50	0.000	0.000
25.00	8.857	-45.025
27.50	101.860	34.691
28.00	97.431	52.406
30.00	252.436	193.386
30.10	223.649	176.410
36.10	248.745	214.792
36.20	31.001	295.247
Final Grade	-931.503	2883.082

Table G26. Tabulated data for primary fascia bar mat IF5 located in the intermediate and primary reinforced section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF5_2B	IF5_1B
22.50	0.000	0.000
25.00	-405.993	-66.054
27.50	-2795.231	-277.106
28.00	-2877.396	-262.607
30.00	-3072.338	-2609.957
30.10	-2949.895	-2547.124
36.10	-3417.110	-1912.357
36.20	-3280.168	-1735.138
Final Grade	8844.853	4456.259

Table G27. Tabulated data for primary fascia bar mat IF5 located in the intermediate and primary reinforced section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF5_2T	IF5_1T
22.50	0.000	0.000
25.00	397.938	33.833
27.50	2590.623	393.105
28.00	2724.343	335.106
30.00	2534.236	3072.338
30.10	2493.958	2880.619
36.10	2877.396	2348.961
36.20	2937.007	2377.960
Final Grade	11701.305	21445.143

Table G28. Tabulated data for primary fascia bar mat PF5 located in the primary reinforced only section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF5_2	PF5_1
22.50	0.000	0.000
25.00	-88.574	2.214
27.50	-199.291	55.359
28.00	-198.553	62.002
30.00	-261.293	6.643
36.10	-295.247	97.431
36.20	-222.911	135.813
Connector Lost		

Table G29. Tabulated data for primary fascia bar mat PF5 located in the primary reinforced only section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF5_2B	PF5_1B
22.50	0.000	0.000
25.00	2336.072	91.832
27.50	3315.611	177.219
28.00	3441.276	151.442
30.00	4241.985	2803.287
36.10	4649.589	2506.847
36.20	5168.358	2440.793
Connector Lost		

Table G30. Tabulated data for primary fascia bar mat PF5 located in the primary reinforced only section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF5_2T	PF5_1T
22.50	0.000	0.000
25.00	2181.408	-124.053
27.50	2899.952	302.884
28.00	3054.616	298.051
30.00	3687.772	2843.564
36.10	4267.762	2493.958
36.20	4282.262	2537.458
Connector Lost		

Table G31. Tabulated data for primary fascia bar mat IF6 located in the intermediate and primary reinforced section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF6_2	IF6_1
27.50	0.000	0.000
28.00	20.667	24.358
30.00	-1.476	-1.476
30.10	55.359	40.596
36.10	39.120	-6130.056
36.20	155.743	-6090.198
Final Grade	Bad Gage	Bad Gage

Table G32. Tabulated data for primary fascia bar mat IF6 located in the intermediate and primary reinforced section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF6_2B	IF6_1B
27.50	0.000	0.000
28.00	17.722	12.889
30.00	127.276	37.055
30.10	-1.611	375.383
36.10	-1113.259	Bad Gage
36.20	-702.433	Bad Gage
Final Grade	Bad Gage	Bad Gage

Table G33. Tabulated data for primary fascia bar mat IF6 located in the intermediate and primary reinforced section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat IL1 (ft)	IF6_2T	IF6_1T
0.00	0.000	0.000
28.00	19.333	-11.278
30.00	178.830	32.222
30.10	51.555	389.882
36.10	1164.814	578.379
36.20	720.155	542.935
Final Grade	Bad Gage	Bad Gage

Table G34. Tabulated data for primary fascia bar mat PF6 located in the primary reinforced only section (full bridge data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF6_2	PF6_1
25.00	0.000	0.000
27.50	19.929	59.787
28.00	33.215	57.573
30.00	48.716	59.787
36.10	16.977	95.217
36.20	28.787	90.050
Final Grade	411.131	Bad Gage

Table G35. Tabulated data for primary fascia bar mat PF6 located in the primary reinforced only section (half bridge bottom data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF6_2B	PF6_1B
25.00	0.000	0.000
27.50	11.278	8.055
28.00	1.611	4.833
30.00	1528.919	14.500
36.10	2021.911	327.050
36.20	2208.797	109.554
Final Grade	-7146.770	Bad Gage

Table G36. Tabulated data for primary fascia bar mat PF6 located in the primary reinforced only section (half bridge top data).

	Measured Bar Force (lb)	
Height of fill above bar mat PL1 (ft)	PF6_2T	PF6_1T
25.00	0.000	0.000
27.50	53.166	83.776
28.00	61.221	54.777
30.00	1598.196	130.498
36.10	2210.408	434.993
36.20	2042.855	86.999
Final Grade	15413.243	Bad Gage

Appendix H

Table H1. Tabulated data for pressure plates.

Date	18-Oct-99		21-Oct-99	
Fill Height	0 ft		4 ft	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	-2.290		3.040	6.790
23 - 3 ft from wall face	-3.880		5.250	7.700
24 - 6 ft from wall face	-2.230		3.450	8.870
25 - 15 ft from wall face	-2.270		3.540	9.560
26 - 30 ft from wall face	-2.140		4.230	9.600

Date	23-Oct-99		27-Oct-99	
Fill Height	6 ft		8 ft	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	3.780	7.780	4.800	10.190
23 - 3 ft from wall face	6.470	8.850	7.520	10.450
24 - 6 ft from wall face	6.580	9.100	10.660	9.780
25 - 15 ft from wall face	5.980	9.880	7.730	10.240
26 - 30 ft from wall face	6.850	10.000	9.410	10.410

Date	29-Oct-99		01-Nov-99	
Fill Height	12 ft		15 ft	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	4.700	9.530	4.998	7.630
23 - 3 ft from wall face	8.040	10.560	8.837	9.120
24 - 6 ft from wall face	15.280	10.130	20.245	10.217
25 - 15 ft from wall face	9.480	10.330	10.606	10.506
26 - 30 ft from wall face	12.620	10.570	14.950	10.730

Date	05-Nov-99		06-Nov-99	
Fill Height	19 ft		22 ft	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	5.024	8.795	5.100	10.842
23 - 3 ft from wall face	9.780	9.422	10.092	10.891
24 - 6 ft from wall face	28.912	9.880	32.159	10.169
25 - 15 ft from wall face	13.043	10.440	13.591	10.542
26 - 30 ft from wall face	19.114	10.746	20.436	10.891

Date	15-Nov-99		24-Nov-99	
Fill Height	25 ft		30 ft	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	4.778	7.040	4.518	2.429
23 - 3 ft from wall face	10.328	8.600	10.160	5.136
24 - 6 ft from wall face	38.267	9.960	38.443	9.169
25 - 15 ft from wall face	15.983	10.260	16.971	10.390
26 - 30 ft from wall face	24.343	10.734	26.581	10.963

Table H1 (continued). Tabulated data for pressure plates.

Date	09-Dec-99		22-Dec-99	
Fill Height	36 ft		36 ft	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	4.365	1.745	4.778	2.833
23 - 3 ft from wall face	10.631	3.505	11.186	4.528
24 - 6 ft from wall face	43.019	7.562	47.070	7.018
25 - 15 ft from wall face	19.546	10.169	22.690	9.856
26 - 30 ft from wall face	28.962	11.155	32.197	11.323

Date	02-Nov-02		02-Nov-02	
	Final Grade - UDOT*		Final Grade - USU*	
Pressure Plate	Pressure (psi)	Temp (deg C)	Pressure (psi)	Temp (deg C)
22 - 1 ft from wall face	2.115	10.578	2.341	10.578
23 - 3 ft from wall face	6.846	13.025	6.948	13.025
24 - 6 ft from wall face	41.621	16.791	41.904	16.791
25 - 15 ft from wall face	20.738	18.154	20.764	18.154
26 - 30 ft from wall face	8.119	252.000	4.014	18.154

* Pressure Plate readings were taken on 02-Nov-2002 using both the vibrating wire reader provided by UDOT and a new vibrating wire reader purchased by Utah State University. Since the USU unit uses a different thermistor for temperature readings than those existing in the pressure plates, temperature readings cannot be taken using USU's vibrating wire reader. Thus, the temperature readings taken from the UDOT reader were applied to pressure readings taken using the USU unit, and a temperature correction applied accordingly.

As noted in the table above, Pressure Plate 26 appears to have become non-functional, as both the temperature readings and the pressure readings are unreasonable. For the USU unit data processing, the temperature for Pressure Plate 25 was used to correct the pressure reading. Thus, pressure readings for Pressure Plate 26 appear to be invalid for the most recent set of data.

Appendix I

Table I1. Tabulated data for vertical inclinometer I1.

Fill Height (ft)	0	3	5	5	10	15	18	20
Elevation (ft)	08-Oct-99	12-Oct-99	14-Oct-99	18-Oct-99	21-Oct-99	25-Oct-99	29-Oct-99	02-Nov-99
348.6								
346.6								
344.6								
342.6								
340.6								
338.6								
336.6								
334.6								0.0000
332.6							0.0000	0.2544
330.6							0.0000	0.2436
328.6			0.0000	0.0000	0.0000	0.2748	0.3306	0.5430
326.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.2064	0.2112	0.4140
324.6	0.0000	0.2106	0.6000	0.9216	1.3236	1.4568	1.4328	1.6212
322.6	0.0000	0.0300	0.3036	0.2904	0.3054	0.4308	0.4032	0.5808
320.6	0.0000	0.0291	0.0207	0.0405	0.0279	0.0993	0.0789	0.2535
318.6	0.0000	0.0303	0.0165	0.0303	-0.0045	0.1569	0.1827	0.4149
316.6	0.0000	0.0258	0.0060	0.0138	-0.0306	0.1908	0.2280	0.4740
314.6	0.0000	0.0291	0.0147	0.0291	-0.0003	0.1341	0.1443	0.3555
312.6	0.0000	0.0324	0.0222	0.0414	0.0228	0.0942	0.0900	0.2910
310.6	0.0000	0.0285	0.0165	0.0321	0.0021	0.1329	0.1629	0.3993
308.6	0.0000	0.0276	0.0126	0.0258	-0.0156	0.1716	0.2388	0.5232
306.6	0.0000	0.0291	0.0135	0.0249	-0.0183	0.1785	0.2499	0.5775
304.6	0.0000	0.0297	0.0183	0.0339	0.0051	0.1233	0.1371	0.3357
302.6	0.0000	0.0279	0.0195	0.0279	0.0123	0.0993	0.0897	0.2049
300.6	0.0000	0.0264	0.0198	0.0330	0.0186	0.0768	0.0456	0.1506
298.6	0.0000	0.0243	0.0195	0.0327	0.0267	0.0579	0.0105	0.0921
296.6	0.0000	0.0225	0.0195	0.0333	0.0285	0.0513	0.0015	0.0567
294.6	0.0000	0.0219	0.0201	0.0339	0.0321	0.0423	0.0165	0.0309
292.6	0.0000	0.0207	0.0201	0.0339	0.0333	0.0399	0.0213	0.0201
290.6	0.0000	0.0204	0.0198	0.0324	0.0336	0.0384	0.0234	0.0156
288.6	0.0000	0.0225	0.0213	0.0327	0.0345	0.0375	0.0201	0.0195
286.6	0.0000	0.0252	0.0228	0.0330	0.0360	0.0342	0.0216	0.0216
284.6	0.0000	0.0261	0.0225	0.0315	0.0231	0.0375	0.0075	0.0333
282.6	0.0000	0.0237	0.0159	0.0303	0.0231	0.0273	0.0147	0.0159
280.6	0.0000	0.0240	0.0162	0.0300	0.0216	0.0276	0.0102	0.0240
278.6	0.0000	0.0243	0.0165	0.0297	0.0201	0.0267	0.0075	0.0285
276.6	0.0000	0.0228	0.0162	0.0288	0.0198	0.0252	0.0084	0.0234
274.6	0.0000	0.0222	0.0162	0.0294	0.0216	0.0168	0.0198	0.0030
272.6	0.0000	0.0225	0.0153	0.0291	0.0225	0.0159	0.0219	0.0015
270.6	0.0000	0.0204	0.0144	0.0276	0.0228	0.0144	0.0276	0.0126
268.6	0.0000	0.0204	0.0150	0.0276	0.0228	0.0114	0.0318	0.0198
266.6	0.0000	0.0198	0.0144	0.0270	0.0216	0.0114	0.0300	0.0180
264.6	0.0000	0.0174	0.0138	0.0258	0.0210	0.0084	0.0336	0.0246
262.6	0.0000	0.0159	0.0141	0.0231	0.0213	0.0111	0.0375	0.0339
260.6	0.0000	0.0141	0.0141	0.0231	0.0207	0.0093	0.0303	0.0285
258.6	0.0000	0.0138	0.0132	0.0222	0.0204	0.0090	0.0306	0.0282
256.6	0.0000	0.0138	0.0120	0.0216	0.0192	0.0084	0.0288	0.0264
254.6	0.0000	0.0153	0.0117	0.0213	0.0171	0.0075	0.0237	0.0201
252.6	0.0000	0.0153	0.0105	0.0213	0.0165	0.0063	0.0237	0.0183
250.6	0.0000	0.0165	0.0099	0.0189	0.0135	0.0069	0.0153	0.0075
248.6	0.0000	0.0171	0.0099	0.0189	0.0129	0.0063	0.0135	0.0045
246.6	0.0000	0.0171	0.0099	0.0183	0.0135	0.0051	0.0123	0.0051
244.6	0.0000	0.0162	0.0096	0.0174	0.0114	0.0048	0.0078	0.0000
242.6	0.0000	0.0141	0.0087	0.0153	0.0093	0.0045	0.0057	0.0027
240.6	0.0000	0.0123	0.0069	0.0129	0.0063	0.0045	0.0027	0.0063
238.6	0.0000	0.0102	0.0042	0.0096	0.0060	0.0030	0.0024	0.0054
236.6	0.0000	0.0078	0.0024	0.0066	0.0048	0.0030	0.0024	0.0030
234.6	0.0000	0.0042	0.0006	0.0012	0.0006	0.0042	0.0036	0.0066
232.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table I1 (continued). Tabulated data for vertical inclinometer I1.

Fill Height (ft)	25	28	30	30	30	Sur	Sur	Final
Elevation (ft)	05-Nov-99	08-Nov-99	11-Nov-99	15-Nov-99	24-Nov-99	22-Dec-99	09-Feb-00	02-Nov-02
348.6				0.0000	0.6204	1.0824	1.0344	Bad
346.6				0.0000	0.6192	1.0638	1.0164	Bad
344.6		0.0000	0.3036	0.9396	1.5390	1.9566	1.8990	Bad
342.6		0.0000	0.3120	0.9006	1.4922	1.8600	1.8018	2.3306
340.6	0.0000	0.4302	0.7368	1.2504	1.8318	2.1930	2.1120	2.5358
338.6	0.0000	0.4062	0.7152	1.1694	1.7436	2.0964	2.0052	2.3702
336.6	0.0000	0.3612	0.6738	1.0950	1.6590	1.9404	1.8534	2.2592
334.6	0.3516	0.6810	0.9954	1.4022	1.9572	2.1696	2.0934	2.3954
332.6	0.5664	0.8688	1.1838	1.5714	2.1204	2.3358	2.2530	2.5130
330.6	0.5406	0.8202	1.1376	1.5096	2.0496	2.2530	2.1666	2.4926
328.6	0.8088	1.0566	1.3776	1.7310	2.2512	2.4780	2.3838	2.5244
326.6	0.6678	0.8964	1.2264	1.5630	2.0736	2.3448	2.2422	2.4458
324.6	1.8570	2.0634	2.3958	2.7198	3.2208	3.4716	3.3678	3.6176
322.6	0.8070	0.9912	1.3242	1.6380	2.1246	2.3490	2.2542	2.4536
320.6	0.4803	0.6579	0.9921	1.3143	1.8015	2.0169	1.9353	Casing
318.6	0.7347	0.9999	1.3863	1.8057	2.3799	2.7663	2.7735	Obstructed
316.6	0.7836	1.0272	1.4040	1.7952	2.3400	2.6742	2.6544	
314.6	0.6225	0.8337	1.1913	1.5621	2.0847	2.3535	2.3097	
312.6	0.5520	0.7698	1.1382	1.5408	2.1084	2.4114	2.4066	
310.6	0.7029	0.9657	1.3689	1.8351	2.4705	2.8809	2.8863	
308.6	0.8880	1.2102	1.6560	2.1858	2.8734	3.3036	3.3036	
306.6	0.9303	1.2483	1.6491	2.0769	2.5857	3.7611	3.7611	
304.6	0.5703	0.7599	1.0203	1.2639	1.5651	3.2391	3.2391	
302.6	0.3957	0.5613	0.7827	1.0203	1.3077	2.0493	2.0493	
300.6	0.3132	0.4620	0.6600	0.8550	1.0944	1.7340	1.7340	
298.6	0.2223	0.3441	0.5085	0.6633	0.8505	1.4625	1.4625	
296.6	0.1539	0.2421	0.3723	0.4851	0.6255	1.1559	1.1559	
294.6	0.1047	0.1725	0.2757	0.3585	0.4683	0.8385	0.8385	
292.6	0.0861	0.1449	0.2373	0.3105	0.4221	0.6597	0.6597	
290.6	0.0744	0.1296	0.2130	0.2790	0.3894	0.6066	0.6066	
288.6	0.0759	0.1299	0.2091	0.2715	0.3813	0.5349	0.5349	
286.6	0.0792	0.1350	0.2088	0.2652	0.3660	0.4566	0.4566	
284.6	0.0963	0.1503	0.2187	0.2697	0.3627	0.2529	0.2529	
282.6	0.0783	0.1281	0.1899	0.2331	0.3141	0.2157	0.2157	
280.6	0.0930	0.1488	0.2142	0.2646	0.3522	0.1908	0.1908	
278.6	0.0987	0.1563	0.2217	0.2775	0.3753	0.2037	0.2037	
276.6	0.0870	0.1362	0.1902	0.2286	0.2976	0.2322	0.2322	
274.6	0.0546	0.0936	0.1356	0.1608	0.2124	0.1638	0.1638	
272.6	0.0453	0.0801	0.1161	0.1371	0.1839	0.1209	0.1209	
270.6	0.0234	0.0480	0.0732	0.0780	0.1020	0.1188	0.1188	
268.6	0.0132	0.0354	0.0558	0.0576	0.0738	0.0414	0.0414	
266.6	0.0144	0.0366	0.0552	0.0564	0.0708	0.0120	0.0120	
264.6	0.0024	0.0198	0.0354	0.0354	0.0492	0.0336	0.0336	
262.6	0.0105	0.0051	0.0177	0.0003	0.0045	0.0249	0.0249	
260.6	0.0105	0.0009	0.0111	0.0021	0.0033	0.0087	0.0087	
258.6	0.0102	0.0012	0.0102	0.0036	0.0066	0.0060	0.0060	
256.6	0.0102	0.0012	0.0090	0.0036	0.0066	0.0198	0.0198	
254.6	0.0051	0.0057	0.0135	0.0087	0.0117	0.0189	0.0189	
252.6	0.0027	0.0117	0.0201	0.0189	0.0249	0.0231	0.0231	
250.6	0.0129	0.0309	0.0405	0.0459	0.0591	0.0489	0.0489	
248.6	0.0171	0.0375	0.0477	0.0573	0.0747	0.0819	0.0819	
246.6	0.0153	0.0333	0.0423	0.0519	0.0675	0.0843	0.0843	
244.6	0.0192	0.0360	0.0450	0.0558	0.0720	0.1002	0.1002	
242.6	0.0213	0.0375	0.0471	0.0597	0.0765	0.1053	0.1053	
240.6	0.0231	0.0381	0.0453	0.0579	0.0753	0.0975	0.0975	
238.6	0.0204	0.0342	0.0408	0.0534	0.0726	0.0864	0.0864	
236.6	0.0132	0.0240	0.0300	0.0396	0.0558	0.0618	0.0618	
234.6	0.0126	0.0186	0.0204	0.0228	0.0282	0.0486	0.0486	
232.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table I2. Tabulated data for vertical inclinometer I2.

Fill Height (ft)	0	3	5	5	10	15	18	25
Elevation (ft)	14-Oct-99	18-Oct-99	19-Oct-99	21-Oct-99	25-Oct-99	29-Oct-99	02-Nov-99	05-Nov-99
328.3	0.0000	-0.0588	-0.0552	0.0240	0.0612	0.0642	0.0282	-0.0666
326.3	0.0000	0.0132	0.0258	0.0378	0.0210	0.0282	0.0546	0.1146
324.3	0.0000	0.0246	0.0168	0.0438	0.0528	0.1062	0.2064	0.3672
322.3	0.0000	0.0108	0.0342	0.0780	0.1158	0.2130	0.4056	0.6690
320.3	0.0000	0.0036	0.0402	0.0942	0.1506	0.2802	0.5454	0.8976
318.3	0.0000	0.0048	0.0366	0.0804	0.1116	0.1974	0.3726	0.6072
316.3	0.0000	0.0030	0.0384	0.0828	0.1158	0.1986	0.3588	0.5670
314.3	0.0000	0.0006	0.0426	0.0912	0.1350	0.2400	0.4554	0.7296
312.3	0.0000	0.0024	0.0420	0.0888	0.1308	0.2376	0.4698	0.7764
310.3	0.0000	0.0036	0.0378	0.0792	0.1074	0.1902	0.3618	0.6108
308.3	0.0000	0.0042	0.0354	0.0714	0.0906	0.1530	0.2610	0.3942
306.3	0.0000	0.0054	0.0318	0.0618	0.0714	0.1164	0.1902	0.2916
304.3	0.0000	0.0054	0.0312	0.0588	0.0642	0.1014	0.1578	0.2364
302.3	0.0000	0.0048	0.0312	0.0558	0.0600	0.0930	0.1398	0.2076
300.3	0.0000	0.0042	0.0300	0.0522	0.0552	0.0822	0.1200	0.1722
298.3	0.0000	0.0042	0.0282	0.0486	0.0486	0.0720	0.1008	0.1398
296.3	0.0000	0.0036	0.0258	0.0468	0.0450	0.0666	0.0888	0.1194
294.3	0.0000	0.0048	0.0252	0.0456	0.0432	0.0624	0.0810	0.1032
292.3	0.0000	0.0048	0.0240	0.0438	0.0414	0.0600	0.0774	0.0972
290.3	0.0000	0.0048	0.0240	0.0426	0.0420	0.0594	0.0762	0.0948
288.3	0.0000	0.0054	0.0234	0.0414	0.0408	0.0594	0.0762	0.0930
286.3	0.0000	0.0060	0.0210	0.0378	0.0366	0.0546	0.0696	0.0846
284.3	0.0000	0.0054	0.0192	0.0354	0.0342	0.0522	0.0660	0.0816
282.3	0.0000	0.0054	0.0186	0.0342	0.0330	0.0504	0.0636	0.0774
280.3	0.0000	0.0060	0.0162	0.0306	0.0288	0.0432	0.0540	0.0660
278.3	0.0000	0.0060	0.0156	0.0282	0.0252	0.0402	0.0486	0.0570
276.3	0.0000	0.0072	0.0138	0.0252	0.0228	0.0354	0.0426	0.0486
274.3	0.0000	0.0084	0.0120	0.0234	0.0198	0.0318	0.0372	0.0402
272.3	0.0000	0.0072	0.0114	0.0228	0.0186	0.0312	0.0348	0.0360
270.3	0.0000	0.0072	0.0084	0.0186	0.0138	0.0252	0.0282	0.0270
268.3	0.0000	0.0078	0.0108	0.0192	0.0162	0.0252	0.0276	0.0252
266.3	0.0000	0.0078	0.0054	0.0126	0.0102	0.0198	0.0198	0.0186
264.3	0.0000	0.0078	0.0084	0.0138	0.0114	0.0210	0.0216	0.0198
262.3	0.0000	0.0066	0.0078	0.0114	0.0090	0.0174	0.0174	0.0168
260.3	0.0000	0.0072	0.0066	0.0102	0.0078	0.0162	0.0150	0.0132
258.3	0.0000	0.0066	0.0072	0.0108	0.0084	0.0156	0.0138	0.0114
256.3	0.0000	0.0066	0.0108	0.0138	0.0126	0.0186	0.0168	0.0138
254.3	0.0000	0.0054	0.0078	0.0096	0.0084	0.0144	0.0120	0.0090
252.3	0.0000	0.0054	0.0048	0.0054	0.0042	0.0078	0.0060	0.0036
250.3	0.0000	0.0048	0.0024	0.0024	0.0012	0.0042	0.0030	0.0000
248.3	0.0000	0.0030	0.0024	0.0030	0.0018	0.0042	0.0036	0.0000
246.3	0.0000	0.0030	0.0024	0.0030	0.0012	0.0042	0.0036	-0.0006
244.3	0.0000	0.0042	0.0102	0.0096	0.0096	0.0132	0.0120	0.0078
242.3	0.0000	0.0030	0.0036	0.0018	0.0036	0.0036	0.0036	0.0006
240.3	0.0000	0.0006	-0.0042	-0.0048	-0.0036	-0.0048	-0.0048	-0.0060
238.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table I2 (continued). Tabulated data for vertical inclinometer I2.

Fill Height (ft)	28	30	30	30	30	Sur	Sur	Final
Elevation (ft)	08-Nov-99	11-Nov-99	15-Nov-99	24-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00	02-Nov-02
328.3	-0.1362	-0.1134	-0.1992	-0.3264	-0.4668	-0.3900	-0.7572	Casing cut-off
326.3	0.1194	0.2322	0.3384	0.4026	0.5436	0.9012	0.8748	1.0326
324.3	0.4944	0.7008	0.9612	1.2492	1.6752	2.3100	2.5998	2.7348
322.3	0.9144	1.2132	1.6254	2.1294	2.8260	3.7404	4.3320	4.5192
320.3	1.2444	1.6278	2.1762	2.8722	3.7872	4.9920	5.8680	6.0954
318.3	0.8304	1.1064	1.4970	1.9548	2.3796	3.1494	3.5970	3.6378
316.3	0.7638	1.0302	1.3944	1.8522	2.3958	3.1380	3.6726	3.6228
314.3	1.0026	1.3362	1.8042	2.4228	3.1530	4.0728	4.7898	4.8012
312.3	1.0932	1.4670	2.0070	2.7498	3.5970	4.6320	5.4588	5.4702
310.3	0.8748	1.1862	1.6422	2.2632	2.9442	3.9048	4.6470	4.4844
308.3	0.5112	0.6564	0.8466	1.0656	1.2846	1.8030	2.0430	1.8126
306.3	0.3768	0.4932	0.6492	0.8196	1.0368	1.5000	1.8144	1.6404
304.3	0.3030	0.3966	0.5160	0.6384	0.7872	1.1322	1.3668	1.2054
302.3	0.2646	0.3504	0.4602	0.5802	0.7320	1.0692	1.3188	1.1604
300.3	0.2148	0.2856	0.3714	0.4674	0.5724	0.8436	1.0446	0.8838
298.3	0.1716	0.2316	0.3000	0.3804	0.4758	0.7092	0.8820	0.7254
296.3	0.1434	0.1938	0.2484	0.3162	0.3948	0.5904	0.7314	0.5796
294.3	0.1224	0.1674	0.2154	0.2784	0.3576	0.5340	0.6810	0.5544
292.3	0.1158	0.1602	0.2100	0.2766	0.3702	0.5670	0.7506	0.6378
290.3	0.1140	0.1566	0.1986	0.2610	0.3414	0.5268	0.7152	0.5976
288.3	0.1116	0.1530	0.1896	0.2448	0.3042	0.4464	0.6030	0.4926
286.3	0.1032	0.1428	0.1740	0.2250	0.2772	0.4032	0.5364	0.4134
284.3	0.0990	0.1374	0.1650	0.2148	0.2598	0.3726	0.4878	0.3588
282.3	0.0930	0.1302	0.1554	0.2010	0.2382	0.3378	0.4338	0.3102
280.3	0.0792	0.1110	0.1302	0.1692	0.1914	0.2778	0.3570	0.2316
278.3	0.0684	0.0966	0.1098	0.1410	0.1506	0.2184	0.2736	0.1560
276.3	0.0582	0.0834	0.0906	0.1176	0.1224	0.1776	0.2244	0.1104
274.3	0.0468	0.0696	0.0738	0.0936	0.0894	0.1326	0.1644	0.0570
272.3	0.0414	0.0612	0.0618	0.0786	0.0666	0.0990	0.1146	0.0084
270.3	0.0306	0.0480	0.0462	0.0594	0.0414	0.0684	0.0786	-0.0204
268.3	0.0276	0.0432	0.0396	0.0504	0.0324	0.0558	0.0588	-0.0294
266.3	0.0204	0.0348	0.0318	0.0390	0.0180	0.0396	0.0414	-0.0294
264.3	0.0210	0.0348	0.0318	0.0396	0.0204	0.0426	0.0486	-0.0180
262.3	0.0168	0.0300	0.0264	0.0330	0.0120	0.0366	0.0396	-0.0204
260.3	0.0132	0.0246	0.0192	0.0258	0.0018	0.0234	0.0204	-0.0426
258.3	0.0108	0.0216	0.0150	0.0222	-0.0018	0.0186	0.0156	-0.0294
256.3	0.0132	0.0234	0.0174	0.0246	0.0054	0.0258	0.0222	-0.0144
254.3	0.0084	0.0180	0.0126	0.0174	-0.0024	0.0174	0.0132	-0.0174
252.3	0.0024	0.0102	0.0030	0.0066	-0.0162	0.0024	-0.0012	-0.0348
250.3	-0.0012	0.0060	-0.0024	0.0024	-0.0228	-0.0042	-0.0114	-0.0354
248.3	-0.0012	0.0042	-0.0030	0.0006	-0.0240	-0.0060	-0.0126	-0.0240
246.3	-0.0006	0.0036	-0.0024	0.0030	-0.0210	-0.0042	-0.0060	0.0024
244.3	0.0090	0.0126	0.0090	0.0168	-0.0018	0.0144	0.0156	0.0294
242.3	0.0006	0.0036	0.0000	0.0048	-0.0174	0.0018	-0.0066	0.0000
240.3	-0.0066	-0.0036	-0.0078	-0.0066	-0.0318	-0.0108	-0.0264	-0.0264
238.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table I3. Tabulated data for vertical inclinometer I3.

Fill Height (ft)	5	18	20	28	30
Elevation (ft)	14-Oct-99	29-Oct-99	3-Nov-99	8-Nov-99	11-Nov-99
328.61	0.0000	-0.0222	0.0264	0.0900	0.1200
326.61	0.0000	-0.0570	-0.0150	0.0516	0.1068
324.61	0.0000	-0.0486	-0.0108	0.0516	0.1026
322.61	0.0000	-0.0444	-0.0084	0.0528	0.1020
320.61	0.0000	-0.0498	-0.0138	0.0462	0.0954
318.61	0.0000	-0.0462	-0.0120	0.0444	0.0912
316.61	0.0000	-0.0438	-0.0120	0.0390	0.0822
314.61	0.0000	-0.0414	-0.0108	0.0354	0.0738
312.61	0.0000	-0.0366	-0.0108	0.0300	0.0618
310.61	0.0000	-0.0390	-0.0180	0.0150	0.0420
308.61	0.0000	-0.0366	-0.0210	0.0042	0.0258
306.61	0.0000	-0.0324	-0.0216	-0.0036	0.0120
304.61	0.0000	-0.0288	-0.0222	-0.0120	-0.0018
302.61	0.0000	-0.0264	-0.0216	-0.0168	-0.0102
300.61	0.0000	-0.0018	0.0006	0.0024	0.0060
298.61	0.0000	0.0000	0.0000	0.0000	0.0000

Fill Height (ft)	30	30	Sur	Sur	Final
Elevation (ft)	15-Nov-99	24-Nov-99	22-Dec-99	9-Feb-00	2-Nov-02
328.61	0.2004	0.2766	0.4512	0.2754	0.6858
326.61	0.1578	0.2274	0.3834	0.3144	0.5748
324.61	0.1500	0.2112	0.3516	0.3114	0.5640
322.61	0.1476	0.2064	0.3402	0.3210	0.5808
320.61	0.1380	0.1938	0.3186	0.3372	0.6042
318.61	0.1302	0.1824	0.3072	0.3462	0.5802
316.61	0.1170	0.1638	0.2766	0.3360	0.5466
314.61	0.1044	0.1446	0.2418	0.3036	0.4848
312.61	0.0882	0.1212	0.2046	0.2814	0.4404
310.61	0.0618	0.0870	0.1500	0.2760	0.3684
308.61	0.0408	0.0588	0.1086	0.2850	0.3102
306.61	0.0228	0.0348	0.0672	0.2232	0.2220
304.61	0.0042	0.0108	0.0246	0.1482	0.1296
302.61	-0.0078	-0.0048	-0.0006	0.0510	0.0408
300.61	0.0072	0.0084	0.0096	0.0096	0.0000
298.61	0.0000	0.0000	0.0000	0.0000	0.0000

Appendix J

Table J1. Tabulated data for horizontal inclinometer H1.

Fill Height (ft)	08-Oct-99	11-Oct-99	13-Oct-99	15-Oct-99	21-Oct-99	25-Oct-99	01-Nov-99	08-Nov-99
Depth from ground surface (ft)	1 ft Fill	2 ft Fill	3 ft Fill	5 ft Fill	5 ft Fill	10 ft Fill	15 ft Fill	20 ft Fill
0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.2070	0.1722	1.0596	1.0506	1.0740	1.1022	1.1682
4	0.0000	0.2148	0.1806	1.0614	1.0698	1.1142	1.2198	1.4634
6	0.0000	0.2118	0.1896	1.0704	1.1118	1.1880	1.4076	1.8792
8	0.0000	0.2130	0.2034	1.0908	1.1640	1.2786	1.6386	2.3886
10	0.0000	0.2166	0.2136	1.1034	1.2180	1.3860	1.9338	3.0072
12	0.0000	0.2172	0.2322	1.1358	1.3152	1.5480	2.3316	3.8166
14	0.0000	0.2238	0.2604	1.1844	1.4340	1.7394	2.7870	4.7352
16	0.0000	0.2238	0.2754	1.2078	1.4952	1.8474	3.1176	5.4648
18	0.0000	0.2208	0.2880	1.2294	1.5378	1.9062	3.2514	5.7384
20	0.0000	0.2286	0.2982	1.2456	1.5606	1.9326	3.2742	5.7558
22	0.0000	0.2322	0.3114	1.2600	1.5822	1.9554	3.2826	5.7348
24	0.0000	0.2310	0.3114	1.2624	1.5870	1.9590	3.2724	5.6946
26	0.0000	0.2322	0.3204	1.2756	1.6026	1.9758	3.2706	5.6610
28	0.0000	0.2262	0.3252	1.2828	1.6104	1.9884	3.2688	5.6226
30	0.0000	0.2268	0.3300	1.2894	1.6206	1.9998	3.2604	5.5806
32	0.0000	0.2232	0.3240	1.2864	1.6206	2.0004	3.2388	5.5290
34	0.0000	0.2166	0.3162	1.2792	1.6116	1.9920	3.2112	5.4702
36	0.0000	0.2106	0.3012	1.2660	1.5972	1.9746	3.1800	5.4000
38	0.0000	0.2124	0.2988	1.2570	1.5930	1.9686	3.1536	5.3394
40	0.0000	0.2040	0.2802	1.2378	1.5708	1.9440	3.1134	5.2608
42	0.0000	0.2046	0.2724	1.2288	1.5594	1.9290	3.0810	5.1936
44	0.0000	0.1968	0.2598	1.2162	1.5456	1.9128	3.0450	5.1234
46	0.0000	0.1938	0.2490	1.1988	1.5228	1.8846	2.9970	5.0388
48	0.0000	0.1842	0.2448	1.1892	1.5054	1.8606	2.9478	4.9530
50	0.0000	0.1932	0.2424	1.1868	1.4844	1.8306	2.8914	4.8612
52	0.0000	0.1812	0.2490	1.1910	1.4664	1.8042	2.8350	4.7694

Table J1 (continued). Tabulated data for horizontal inclinometer H1.

Fill Height (ft)	11-Nov-99	15-Nov-99	24-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00	25-Oct-02
Depth from ground surface (ft)	30 ft Fill	30 ft Fill	30 ft Fill	30 ft Fill	Surcharge	Surcharge	Final Grade
0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	1.2522	1.3212	1.5024	1.7352	2.0340	2.3202	2.5386
4	1.6470	1.8504	2.2554	2.7810	3.3984	4.0062	4.0272
6	2.1720	2.5434	3.1830	4.0140	4.9446	5.9022	6.0378
8	2.8104	3.3606	4.2444	5.3934	6.6582	7.9860	8.3628
10	3.5658	4.3068	5.4588	6.9570	8.5974	10.3176	10.7964
12	4.5726	5.5644	7.1022	9.0606	11.1816	13.3776	13.7406
14	5.6796	6.9384	8.8440	11.2146	13.8084	16.4334	16.7088
16	6.5484	8.0394	10.1880	12.8310	15.7008	18.5556	18.9072
18	6.8616	8.4216	10.6278	13.3290	16.2414	19.1202	19.5348
20	6.8790	8.4342	10.6410	13.3344	16.2534	19.1262	19.5474
22	6.8658	8.4114	10.6116	13.2966	16.2198	19.0944	19.5012
24	6.8286	8.3628	10.5546	13.2354	16.1604	19.0320	19.4268
26	6.7998	8.3214	10.5072	13.1790	16.1064	18.9750	19.3602
28	6.7668	8.2806	10.4532	13.1220	16.0476	18.9186	19.2816
30	6.7308	8.2320	10.3962	13.0584	15.9852	18.8544	19.2018
32	6.6846	8.1702	10.3296	12.9834	15.9096	18.7782	19.1154
34	6.6270	8.1012	10.2534	12.9324	15.8250	18.6870	19.0236
36	6.5634	8.0262	10.1700	13.1184	15.7332	18.5922	18.9396
38	6.5106	7.9608	10.0944	13.0356	15.6492	18.5058	18.8298
40	6.4356	7.8756	9.9984	12.9996	15.5478	18.3948	18.7164
42	6.3732	7.8036	9.9156	12.9330	15.4608	18.3000	18.6168
44	6.3108	7.7298	9.8322	12.9366	15.3762	18.2094	18.5178
46	6.2298	7.6392	9.7314	12.8364	15.2694	18.0990	18.4056
48	6.1512	7.5504	9.6354	12.7338	15.1680	17.9952	18.2952
50	6.0642	7.4562	9.5304	12.6246	15.0618	17.8854	18.1848
52	5.9880	7.3770	9.4410	12.5316	14.9808	17.8020	18.0954

Table J2. Tabulated data for vertical inclinometer H2.

	Date / Fill Height					
Depth from ground surface (ft)	21-Oct-99 5 ft Fill	25-Oct-99 10 ft Fill	01-Nov-99 15 ft Fill	08-Nov-99 20 ft Fill	11-Nov-99 30 ft Fill	15-Nov-99 30 ft Fill
0	0.000	1.958	6.301	8.161	8.662	9.661
2	0.000	1.958	6.531	8.699	9.348	10.349
4	0.000	1.957	6.735	9.138	9.844	10.846
6	0.000	1.956	6.682	9.031	9.700	10.702
8	0.000	1.957	6.672	8.993	9.629	10.633
10	0.000	1.958	6.668	8.969	9.571	10.577
12	0.000	1.957	6.669	8.954	9.523	10.534
14	0.000	1.958	6.668	8.936	9.473	10.489
16	0.000	1.961	6.664	8.917	9.424	10.442
18	0.000	1.961	6.662	8.899	9.374	10.393
20	0.000	1.960	6.659	8.881	9.323	10.346
22	0.000	1.961	6.658	8.865	9.275	10.302
24	0.000	1.962	6.650	8.842	9.220	10.252
26	0.000	1.962	6.644	8.818	9.163	10.197
28	0.000	1.961	6.634	8.798	9.110	10.147
30	0.000	1.960	6.628	8.783	9.063	10.103
32	0.000	1.957	6.622	8.756	9.009	10.052
34	0.000	1.958	6.608	8.726	8.950	10.005
36	0.000	1.958	6.606	8.707	8.909	9.974
38	0.000	1.959	6.604	8.684	8.858	9.937
40	0.000	1.960	6.644	8.695	8.841	9.930
42	0.000	1.958	7.157	9.164	9.285	10.379

Table J2 (continued). Tabulated data for vertical inclinometer H2.

	Date / Fill Height				
Depth from ground surface (ft)	24-Nov-99 30 ft Fill	09-Dec-99 30 ft Fill	22-Dec-99 Surcharge	09-Feb-00 Surcharge	25-Oct-02 Final
0	10.661	13.103	15.544	18.851	19.265
2	11.380	13.825	16.275	19.577	20.035
4	11.887	14.346	16.802	20.103	20.464
6	11.731	14.179	16.625	19.928	20.284
8	11.651	14.086	16.526	19.828	20.215
10	11.582	14.007	16.440	19.743	20.089
12	11.525	13.939	16.364	19.667	19.950
14	11.467	13.868	16.287	19.592	19.885
16	11.408	13.800	16.210	19.517	19.777
18	11.349	13.729	16.129	19.441	19.733
20	11.290	13.657	16.052	19.363	19.633
22	11.234	13.589	15.979	19.290	19.564
24	11.173	13.513	15.896	19.209	19.463
26	11.111	13.439	15.815	19.121	19.436
28	11.050	13.365	15.735	19.043	19.333
30	10.993	13.299	15.667	18.981	19.200
32	10.936	13.230	15.595	18.913	19.162
34	10.877	13.162	15.525	18.848	19.135
36	10.840	13.120	15.489	18.829	19.106
38	10.796	13.072	15.451	18.820	19.072
40	10.789	13.061	15.453	18.855	19.135
42	11.236	13.498	15.900	19.325	19.387

Appendix K

Table K1. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary and intermediate reinforcement.

Data for extensometers located 16 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	-0.3125	-0.3750	-0.3750	-1.4375			-1.3125
25					0.0000	1.5000		1.5000
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	-0.9375	-0.3750	0.0625	0.5625	1.9375	3.0625	3.1250
25	1.9375	2.3125	2.9375	3.1875	4.5625	5.6875	5.8125
20	0.2500		0.9375	2.6875	2.9375	4.1875	4.5625
15	0.0000		0.8750	1.1250	2.7500	3.8750	4.3125
10			0.0000	0.2500	1.7500	2.7500	2.8750
5					0.0000	1.3750	Removed

Table K2. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary and intermediate reinforcement.

Data for extensometers located 8 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	-0.2500	-0.3750	-0.3125	-1.0000			-0.6875
25					0.0000	-0.3125		-0.3125
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	-0.4375	0.0000	0.0625	0.7500	2.5000	3.7500	4.5000
25	0.1250	0.6250	1.0000	1.6250	2.8750	4.1250	4.1250
20	0.3750		1.0625	1.8125	2.8125	4.8125	4.6875
15	0.0000		0.9375	1.6875	2.9375	4.0625	4.4375
10			0.0000	0.7500	2.3750	3.5000	3.6250
5					0.0000	1.3750	Removed

Table K3. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary and intermediate reinforcement.

Data for extensometers located 4 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	3.0000	3.1250	3.1250	2.3750			2.6875
25					0.0000	0.2500		0.5000
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	2.9375	3.4375	3.7500	4.5000	6.0000	7.2500	7.6250
25	0.8125	0.5000	2.0000	2.1250	3.6250	4.8750	5.2500
20	-1.1250		1.0625	1.5625	3.6875	6.0625	6.3125
15	0.0000		1.1250	1.5000	3.3750	5.0000	5.0000
10			0.0000	0.3750	2.1250	4.0000	3.8750
5					0.0000	0.5005	Removed

Table K4. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary and intermediate reinforcement.

Data for extensometers located 2 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	0.3125	0.9375	0.9375	-0.2500			0.0625
25					0.0000	0.2500		0.5000
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	0.1875	0.6875	1.0000	1.5000	3.1250	5.1250	5.2500
25	0.8125	1.2500	1.7500	3.5000	3.7500	5.5000	5.7500
20	0.5625		1.2500	2.0000	3.8750	6.3750	6.7500
15	0.0000		5.6250	6.2500	7.6250	8.1250	8.1250
10			0.0000	0.3750	3.0000	4.1250	4.3750
5					Lost	Lost	Removed

Table K5. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary and intermediate reinforcement.

Data for extensometers located 1 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	-0.5000	-0.5000	-0.1250	-1.1250			-1.1250
25					Lost	Lost		Lost
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	-0.8125	-0.3125	0.0000	0.6875	1.5625	1.9375	1.8125
25	Lost	Lost	Lost	Lost	Lost	Lost	Lost
20	0.3750		1.1250	2.0000	3.1250	3.2500	3.5000
15	0.0000		1.3125	2.1875	3.4375	3.6875	4.0625
10			0.0000	0.5000	2.1250	4.3750	4.2500
5					0.0000	0.5000	Removed

Table K6. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary reinforcement only.

Data for extensometers located 16 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	Lost	Lost	Lost	Lost	Lost	Lost	Lost
25					0.0000	-0.1250		0.3125
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	Lost	Lost	Lost	Lost	Lost	Lost	Lost
25	0.5000	1.1250	1.2500	2.2500	2.6250	2.5000	2.5000
20	0.1875		1.1250	1.5000	2.5000	2.2500	2.3750
15	0.0000		0.9375	0.1875	1.9375	2.4375	1.9375
10			0.0000	0.0000	1.5000	1.7500	1.2500
5					0.0000	-0.1250	Removed

Table K7. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary reinforcement only.

Data for extensometers located 8 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	0.0000	0.0625	-0.1875	-0.3750			-0.1250
25					0.0000	0.0000		0.3125
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	0.0000	0.6875	0.8750	1.1250	1.7500	2.2500	1.8750
25	0.5625	1.1250	1.2500	1.7500	2.6250	2.3750	2.0000
20	0.3125		1.0625	1.6875	2.4375	1.5625	1.9375
15	0.0000		1.1875	1.1875	2.3125	2.1875	2.1875
10			0.0000	0.8750	1.2500	1.0000	1.1250
5					0.0000	-0.2500	Removed

Table K8. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary reinforcement only.

Data for extensometers located 4 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	1.1875	1.1250	1.1250	1.0000			1.2500
25					0.0000	0.3125		0.6875
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	1.7500	1.9375	2.2500	2.6250	3.3750	3.0000	2.8750
25	0.9375	1.6250	1.6875	2.1875	2.9375	2.5625	2.5625
20	0.0000		1.2500	1.6250	2.2500	2.0000	1.3750
15	0.0000		2.2500	1.8750	2.8750	2.1250	2.0000
10			0.0000	0.6250	1.6250	2.0000	1.7500
5					0.0000	-0.7500	Removed

Table K9. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary reinforcement only.

Data for extensometers located 2 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	0.8750	1.1250	1.3750	1.0625			1.5625
25					0.0000	0.2500		0.8750
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	1.6875	2.1875	2.5000	2.7500	3.6250	3.1250	3.2500
25	0.8750	1.5625	1.9375	2.1875	3.1875	2.6875	2.6875
20	0.5000		1.2500	1.7500	3.0000	3.3750	3.2500
15	0.0000		0.8750	2.0000	3.1250	3.3750	3.7500
10			0.0000	0.7500	1.7500	2.0000	1.3750
5					0.0000	0.2500	Removed

Table K9. Tabulated data for horizontal extensometers located in the instrumented section of wall with primary reinforcement only.

Data for extensometers located 1 ft from wall face (displacements in inches).

Distance from Top of Wall (ft)	18-Oct-99	19-Oct-99	21-Oct-99	23-Oct-99	27-Oct-99	28-Oct-99	29-Oct-99	01-Nov-99
30	0.0000	1.2500	1.4375	1.6875	1.7500			2.1875
25					0.0000	0.3750		0.8750
20							0.0000	
15								
10								
5								

Distance from Top of Wall (ft)	04-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	09-Feb-00	07-Jun-00
30	2.2500	2.8750	3.0000	3.3750	4.3750	4.6250	4.6250
25	0.7500	1.8125	1.8750	2.2500	3.2500	3.6250	3.6250
20	0.5000		1.6250	1.7500	2.8750	3.1250	3.1250
15	0.0000		1.2500	1.7500	3.0000	3.5000	3.2500
10			0.0000	0.3750	2.1250	2.0000	1.6250
5					0.0000	0.6250	Removed

Appendix L

Table L1. Tabulated data for Sondex Tube S1.

Fill E.L. (ft)	327.7	329.34	332.77	342.44	348.27	349.66	351.63
Casing Elevation (ft)	331.4	331.36	336.35	346.21	351.08	350.96	356.03
Date	12-Oct-99	14-Oct-99	20-Oct-99	29-Oct-99	02-Nov-99	05-Nov-99	11-Nov-99
Sensor Ring	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
1							
2							
3						8.63	8.74
4					6.96	6.93	12.09
5					13.20	13.18	18.33
6				13.12	18.02	18.00	23.15
7			5.89	15.79	20.69	20.67	25.81
8		3.12	8.13	18.03	22.93	22.91	28.05
9	4.38	4.42	9.43	19.35	24.25	24.23	29.37
10	7.29	7.32	12.34	22.25	27.15	27.14	32.28
11	10.30	10.32	15.35	25.25	30.15	30.14	35.23
12	13.34	13.35	18.39	28.29	33.19	33.18	38.26
13	16.35	16.35	21.39	31.29	36.18	36.17	41.25
14	19.34	19.34	24.37	34.25	39.17	39.14	44.22
15	22.39	22.37	27.39	37.29	42.17	42.18	47.26
16	25.25	25.23	30.25	40.15	45.03	45.03	50.11
17	28.35	28.32	33.34	43.24	48.13	48.06	53.16
18	31.40	31.37	36.39	46.28	51.17	51.10	56.19
19	34.43	34.39	39.4	49.29	54.19	54.11	59.19
20	37.39	37.35	42.35	52.25	57.15	57.05	62.13
21	40.40	40.36	45.36	55.24	60.15	60.05	65.13
22	43.36	43.32	48.31	58.18	63.10	62.99	68.07
23	46.28	46.24	51.23	61.1	66.01	65.90	70.98
24	49.25	49.21	54.2	64.07	68.95	68.84	73.92
25	52.17	52.13	57.12	66.98	71.87	71.76	76.83
26	55.14	55.10	60.09	69.95	74.84	74.72	79.79
27	58.13	58.09	63.08	72.94	77.82	77.70	82.77
28	61.03	60.99	65.98	75.84	80.72	80.60	85.67
29	64.08	64.04	69.03	78.89	83.76	83.65	88.72
30	67.06	67.02	72.01	81.87	86.74	86.63	91.70
31	69.95	69.91	74.9	84.76	89.63	89.51	94.58
32	72.99	72.95	77.94	87.8	92.67	92.55	97.62
33	75.80	75.76	80.75	90.61	95.48	95.36	
34	78.77	78.73	83.72	93.58	98.45	98.33	
35	81.69	81.65	86.64	96.5			
36	84.64	84.60	89.59	99.45			
37	87.56	87.52	92.51				

Table L1 (continued). Tabulated data for Sondex Tube S1.

Fill E.L. (ft)	354.42	354.4	360.76	361.82	361.98	361.98
Casing Elevation (ft)	355.84	360.74	360.72	360.71	360.64	*
Date	15-Nov-99	24-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00	02-Nov-02
Sensor Ring	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
1		4.31	4.54	4.66	4.79	Casing Cutoff
2	3.76	8.73	8.91	8.95	9.17	Casing Cutoff
3	8.87	13.99	14.05	14.24	14.28	14.55
4	12.06	17.20	17.28	17.50	17.60	17.98
5	18.30	23.34	23.51	23.75	23.85	24.02
6	23.12	28.23	28.40	28.56	28.66	28.86
7	25.78	30.89	31.06	31.22	31.32	31.60
8	28.02	33.13	33.30	33.46	33.56	33.76
9	29.34	34.45	34.62	34.78	34.88	35.07
10	32.25	37.36	37.53	37.69	37.79	37.82
11	35.24	40.36	40.52	40.68	40.79	40.81
12	38.26	43.40	43.63	43.64	43.85	43.89
13	41.26	46.40	46.50	46.61	46.83	46.85
14	44.20	49.27	49.29	49.35	49.42	49.43
15	47.23	52.26	52.29	52.31	52.36	52.45
16	50.03	55.03	55.02	55.03	55.13	55.13
17	52.96	57.95	57.99	58.01	57.98	57.96
18	56.00	60.99	61.04	61.05	61.01	61.00
19	59.02	64.00	64.04	64.05	64.02	63.99
20	61.98	66.96	66.99	67.00	66.98	66.94
21	64.97	69.96	69.98	69.99	69.96	69.93
22	67.92	72.90	72.91	72.91	72.87	72.83
23	70.83	75.81	75.82	75.83	75.78	75.76
24	73.79	78.76	78.76	78.77	78.73	78.57
25	76.68	81.64	81.66	81.66	81.60	81.51
26	79.64	84.61	84.62	84.62	84.56	84.45
27	82.61	87.57	87.59	87.59	87.53	87.40
28	85.49	90.47	90.47	90.47	90.41	90.32
29	88.54	93.50	93.50	93.49	93.43	93.36
30	91.51	96.44	96.44	96.45	96.40	96.34
31	94.39	99.30	99.29	99.29	99.23	99.23
32	97.43					102.23
33						105.10
34						108.01

* 02-Nov-2002 data adjusted based on previous casing elevation.

Table L2. Tabulated data for Sondex Tube S2.

Fill E.L. (ft)	329.34	331.15	332.77	342.44	348.27	349.66	351.63
Casing Elevation (ft)	327.83	327.83	327.83	327.83	327.83	327.83	327.83
Date	14-Oct-99	19-Oct-99	20-Oct-99	29-Oct-99	02-Nov-99	05-Nov-99	11-Nov-99
Sensor Ring	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
1	4.93	4.95	4.98	4.98	4.98	4.98	5
2	8	8.02	8.04	8.04	8.04	8.05	8.06
3	10.82	10.83	10.84	10.85	10.87	10.87	10.87
4	13.66	13.66	13.66	13.67	13.67	13.68	13.69
5	16.53	16.53	16.53	16.54	16.55	16.56	16.57
6	19.36	19.36	19.36	19.39	19.39	19.39	19.41
7	22.21	22.21	22.21	22.21	22.23	22.24	22.25
8	25.11	25.11	25.11	25.11	25.12	25.14	25.15
9	28.02	28.02	28.02	28.02	28.03	28.04	28.05
10	30.9	30.9	30.9	30.9	30.91	30.92	30.93
11	33.88	33.88	33.88	33.88	33.9	33.91	33.91
12	36.8	36.8	36.8	36.8	36.82	36.82	36.82
13	39.75	39.75	39.75	39.75	39.76	39.77	39.77
14	42.7	42.7	42.7	42.7	42.7	42.71	42.71
15	45.64	45.64	45.64	45.64	45.65	45.65	45.66
16	48.59	48.59	48.59	48.59	48.59	48.6	48.6
17	51.58	51.58	51.58	51.58	51.58	51.58	51.59
18	54.54	54.54	54.54	54.54	54.54	54.54	54.54
19	57.54	57.54	57.54	57.54	57.54	57.54	57.54
20	60.5	60.5	60.5	60.5	60.5	60.5	60.5
21	63.41	63.41	63.41	63.41	63.41	63.41	63.41
22	66.35	66.35	66.35	66.35	66.35	66.35	66.35
23	69.28	69.28	69.28	69.28	69.28	69.28	69.28
24	72.24	72.24	72.24	72.24	72.24	72.24	72.24
25	75.24	75.24	75.24	75.24	75.24	75.24	75.24
26	78.15	78.15	78.15	78.15	78.15	78.15	78.15
27	81.13	81.13	81.13	81.13	81.13	81.13	81.13
28	84.06	84.06	84.06	84.06	84.06	84.06	84.06
29	87.11	87.11	87.11	87.11	87.11	87.11	87.11
30	89.82	89.82	89.82	89.82	89.82	89.82	89.82

Table L2 (continued). Tabulated data for Sondex Tube S2.

Fill E.L. (ft)	354.42	354.42	N/A	361.82	361.98	355.00
Casing Elevation (ft)	327.83	327.83	327.83	327.77	327.68	*
Date	15-Nov-99	24-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00	02-Nov-02
Sensor Ring	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
1	5.03	5.05	5.09	5.14	5.2	Casing cut off
2	8.08	8.09	8.1	8.14	8.24	8.23
3	10.88	10.9	10.91	10.97	11.03	11.12
4	13.71	13.74	13.76	13.79	13.86	14.02
5	16.58	16.6	16.62	16.65	16.69	16.82
6	19.41	19.42	19.42	19.48	19.51	19.51
7	22.25	22.26	22.27	22.33	22.35	22.35
8	25.15	25.16	25.17	25.23	25.25	25.23
9	28.05	28.07	28.07	28.11	28.15	28.13
10	30.93	30.95	30.95	31	31.02	31.01
11	33.91	33.92	33.92	33.98	33.99	33.97
12	36.82	36.84	36.84	36.87	36.88	36.88
13	39.78	39.78	39.8	39.82	39.83	39.84
14	42.73	42.74	42.74	42.76	42.77	42.78
15	45.67	45.68	45.68	45.7	45.73	45.68
16	48.61	48.62	48.62	48.64	48.65	48.63
17	51.59	51.6	51.6	51.61	51.62	51.61
18	54.55	54.56	54.57	54.58	54.59	54.58
19	57.54	57.54	57.56	57.57	57.58	57.52
20	60.5	60.5	60.5	60.51	60.52	60.49
21	63.41	63.41	63.41	63.43	63.43	63.43
22	66.35	66.35	66.35	66.36	66.37	66.35
23	69.28	69.28	69.28	69.28	69.29	69.28
24	72.24	72.24	72.24	72.24	72.25	72.25
25	75.24	75.24	75.24	75.24	75.25	75.23
26	78.15	78.15	78.15	78.15	78.15	78.15
27	81.13	81.13	81.13	81.13	81.13	81.11
28	84.06	84.06	84.06	84.06	84.06	84.07
29	87.11	87.11	87.11	87.11	87.11	87.11
30	89.82	89.82	89.82	89.82	89.82	89.82

* 02-Nov-2002 data adjusted based on position of Sensor Ring 30.

Table L3. Tabulated data for Sondex Tube S3.

Fill E.L. (ft)	327.7	329.34	331.15	332.77	342.44	348.27	351.63	351.63
Casing Elevation (ft)	329.13	329.13	329.13	329.13	329.13	329.13	329.13	329.13
Date	12-Oct-99	14-Oct-99	19-Oct-99	20-Oct-99	29-Oct-99	02-Nov-99	08-Nov-99	11-Nov-99
Sensor Ring	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
1	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85
2	7.74	7.74	7.74	7.74	7.74	7.74	7.74	7.74
3	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64
4	13.55	13.55	13.55	13.55	13.55	13.55	13.55	13.55
5	16.56	16.56	16.56	16.56	16.56	16.56	16.56	16.56
6	19.49	19.49	19.49	19.49	19.49	19.49	19.49	19.49
7	22.49	22.49	22.49	22.49	22.49	22.49	22.49	22.49
8	25.36	25.36	25.36	25.36	25.36	25.36	25.36	25.36
9	28.38	28.38	28.38	28.38	28.38	28.38	28.38	28.38
10	31.35	31.35	31.35	31.35	31.35	31.35	31.35	31.35
11	34.30	34.30	34.30	34.30	34.30	34.30	34.30	34.30
12	37.28	37.28	37.28	37.28	37.28	37.28	37.28	37.28
13	40.30	40.30	40.30	40.30	40.30	40.30	40.30	40.30
14	43.30	43.30	43.30	43.30	43.30	43.30	43.30	43.30
15	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35
16	49.34	49.34	49.34	49.34	49.34	49.34	49.34	49.34
17	52.43	52.43	52.43	52.43	52.43	52.43	52.43	52.43
18	55.41	55.41	55.41	55.41	55.41	55.41	55.41	55.41
19	58.54	58.54	58.54	58.54	58.54	58.54	58.54	58.54
20	61.62	61.62	61.62	61.62	61.62	61.62	61.62	61.62
21	64.66	64.66	64.66	64.66	64.66	64.66	64.66	64.66
22	67.74	67.74	67.74	67.74	67.74	67.74	67.74	67.74
23	70.85	70.85	70.85	70.85	70.85	70.85	70.85	70.85
24	73.84	73.84	73.84	73.84	73.84	73.84	73.84	73.84
25	76.89	76.89	76.89	76.89	76.89	76.89	76.89	76.89
26	79.94	79.94	79.94	79.94	79.94	79.94	79.94	79.94
27	83.02	83.02	83.02	83.02	83.02	83.02	83.02	83.02
28	86.00	86.00	86.00	86.00	86.00	86.00	86.00	86.00
29	89.02	89.02	89.02	89.02	89.02	89.02	89.02	89.02
30	90.52	90.52	90.52	90.52	90.52	90.52	90.52	90.52

Table L3 (continued). Tabulated data for Sondex Tube S3.

Fill E.L. (ft)	354.42	354.42	N/A	361.81	361.98	355.00	355.00
Casing Elevation (ft)	329.13	329.13	329.13	329.13	329.13	329.13	329.13
Date	15-Nov-99	24-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00	12-Oct-02	02-Nov-02
Sensor Ring	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)	Distance (ft)
1	4.85	4.86	4.87	4.87	4.88	4.94	4.93
2	7.74	7.74	7.75	7.76	7.77	7.81	7.81
3	10.64	10.64	10.65	10.65	10.66	10.71	10.72
4	13.55	13.55	13.55	13.56	13.57	13.65	13.66
5	16.56	16.56	16.56	16.57	16.57	16.61	16.61
6	19.49	19.49	19.49	19.49	19.50	19.58	19.58
7	22.49	22.49	22.49	22.49	22.5	22.56	22.55
8	25.36	25.36	25.36	25.36	25.36	25.47	25.47
9	28.38	28.38	28.38	28.38	28.38	28.45	28.43
10	31.35	31.35	31.35	31.35	31.35	31.46	31.46
11	34.30	34.30	34.30	34.30	34.30	34.44	34.43
12	37.28	37.28	37.28	37.28	37.28	37.38	37.38
13	40.30	40.30	40.30	40.30	40.30	40.40	40.40
14	43.30	43.30	43.30	43.30	43.30	43.41	43.40
15	46.35	46.35	46.35	46.35	46.35	46.43	46.43
16	49.34	49.34	49.34	49.34	49.34	49.45	49.44
17	52.43	52.43	52.43	52.43	52.43	52.49	52.50
18	55.41	55.41	55.41	55.41	55.41	55.49	55.49
19	58.54	58.54	58.54	58.54	58.54	58.62	58.61
20	61.62	61.62	61.62	61.62	61.62	61.69	61.69
21	64.66	64.66	64.66	64.66	64.66	64.77	64.76
22	67.74	67.74	67.74	67.74	67.74	67.84	67.84
23	70.85	70.85	70.85	70.85	70.85	70.94	70.96
24	73.84	73.84	73.84	73.84	73.84	73.93	73.94
25	76.89	76.89	76.89	76.89	76.89	76.98	76.98
26	79.94	79.94	79.94	79.94	79.94	80.04	80.03
27	83.02	83.02	83.02	83.02	83.02	83.13	83.13
28	86.00	86.00	86.00	86.00	86.00	86.08	86.08
29	89.02	89.02	89.02	89.02	89.02	89.11	89.10
30	90.52	90.52	90.52	90.52	90.52	90.61	90.60

Appendix M

Table M1. Tabulated data for settlement of survey monuments.

Fill Height (ft)	2	3	5	10	14	25	Sur	Sur
Date	07-Oct-99	12-Oct-99	14-Oct-99	21-Oct-99	27-Oct-99	05-Nov-99	30-Dec-99	12-Jan-00
Monument	Elevation Reading (ft)							
1	326.798	326.798	326.801	326.795	326.795	326.795	326.791	326.791
2	327.162	327.162	327.162	327.162	327.162	327.162	327.162	327.162
3	326.916	326.916	326.916	326.913	326.913	326.913	326.913	326.913
4	327.520	327.520	327.523	327.516	327.516	327.513	327.513	327.513
5	327.612	327.612	327.615	327.608	327.608	327.605	327.608	327.608
6	327.497	327.497	327.497	327.490	327.493	327.490	327.493	327.493
7	327.753	327.753	327.756	327.746	327.746	327.746	327.746	327.746
8	327.680	327.680	327.684	327.677	327.677	327.680	327.684	327.684
9	326.306	326.306	326.312	326.299	326.302	326.302	326.309	326.309
10				325.867	325.423	325.287	324.571	324.507

Fill Height (ft)	2	3	5	10	14	25	Sur	Sur
Date	07-Oct-99	12-Oct-99	14-Oct-99	21-Oct-99	27-Oct-99	05-Nov-99	30-Dec-99	12-Jan-00
Monument	Settlement (inches)							
1	0.000	0.000	-0.039	0.039	0.039	0.039	0.079	0.079
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.039	0.039	0.039	0.039	0.039
4	0.000	0.000	-0.039	0.039	0.039	0.079	0.079	0.079
5	0.000	0.000	-0.039	0.039	0.039	0.079	0.039	0.039
6	0.000	0.000	0.000	0.079	0.039	0.079	0.039	0.039
7	0.000	0.000	-0.039	0.079	0.079	0.079	0.079	0.079
8	0.000	0.000	-0.039	0.039	0.039	0.000	-0.039	-0.039
9	0.000	0.000	-0.079	0.079	0.039	0.039	-0.039	-0.039
10				0.000	5.335	6.961	15.555	16.327

Appendix N

Table N1. Tabulated data for movement in toe bulge located in the instrumented section of wall with primary and intermediate reinforcement (fascia bar mat 28).

Fill	22.5'	25'	27.5'	27.5'	30'	33'	Sur	Sur
Date	04-Nov-99	05-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00
Point	Bulge Displacement (inches)							
1	0.000	0.120	0.384	0.480	1.572	1.812	1.920	2.328
2	0.000	0.060	0.624	1.176	1.812	1.968	2.448	2.676
3	0.000	0.132	0.624	1.128	1.632	2.028	2.424	2.580

Table N2. Tabulated data for movement in toe bulge located in the instrumented section of wall with primary reinforcement only (fascia bar mats 14 through 16).

Fill	17.5	20'	20'	22.5	25'	27.5'	27.5'	30'	33'	Sur	Sur
Date	01-Nov-99	02-Nov-99	03-Nov-99	04-Nov-99	05-Nov-99	08-Nov-99	11-Nov-99	16-Nov-99	09-Dec-99	22-Dec-99	09-Feb-00
Point	Bulge Displacement (inches)										
1	0.000	0.624	0.744	0.864	0.996	1.680	1.992	2.748	3.180	3.240	3.240
2	0.000	0.636	0.756	1.008	1.068	1.692	2.136	2.508	3.132	3.132	3.132
3	0.000	0.564	0.756	0.936	1.068	1.620	2.064	2.880	3.372	3.372	3.372
4	0.000	0.564	0.816	0.936	1.068	1.560	2.064	2.688	3.060	3.060	3.060
5	0.000	0.504	0.816	0.996	1.188	1.812	2.316	3.000	3.252	3.372	3.372
6	0.000	0.564	0.876	1.056	1.308	2.004	2.556	3.312	3.564	3.816	3.816
7	0.000	0.504	0.816	0.888	1.260	1.944	2.508	3.264	3.636	3.888	3.888
8	0.000	0.444	0.756	0.876	1.248	2.064	2.436	3.252	3.756	3.876	3.876
9	0.000	0.384	0.696	0.816	1.200	1.824	2.316	3.192	3.444	3.696	3.696
10	0.000	0.312	0.624	0.756	0.996	1.692	2.256	3.000	3.120	3.132	3.132
11	0.000	0.252	0.504	0.564	0.876	1.128	1.872	2.508	2.508	2.628	2.760
12	0.000	0.312	0.492	0.564	0.876	1.428	1.932	2.688	2.688	2.688	2.688
13	0.000	0.252	0.444	0.564	0.816	1.440	1.884	2.568	2.568	2.568	2.568
14	0.000	0.192	0.444	0.504	0.816	1.440	1.812	2.568	2.568	2.568	2.568
15	0.000	0.120	0.372	0.432	0.804	1.368	1.872	2.556	2.556	2.556	2.556
16	0.000	0.132	0.372	0.564	0.876	1.632	2.064	2.940	2.940	2.940	3.192
17	0.000	0.060	0.312	0.504	0.816	1.560	1.932	2.940	2.928	2.928	3.432

Appendix O

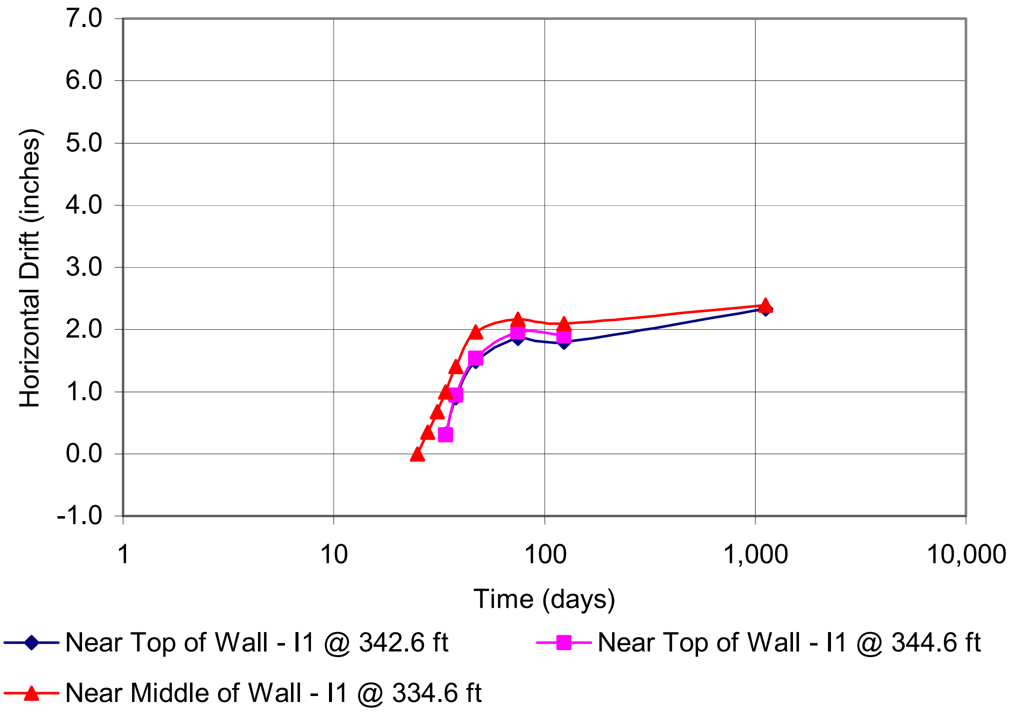

Figure O1. Horizontal drift as calculated from vertical inclinometer I1 at given elevations.

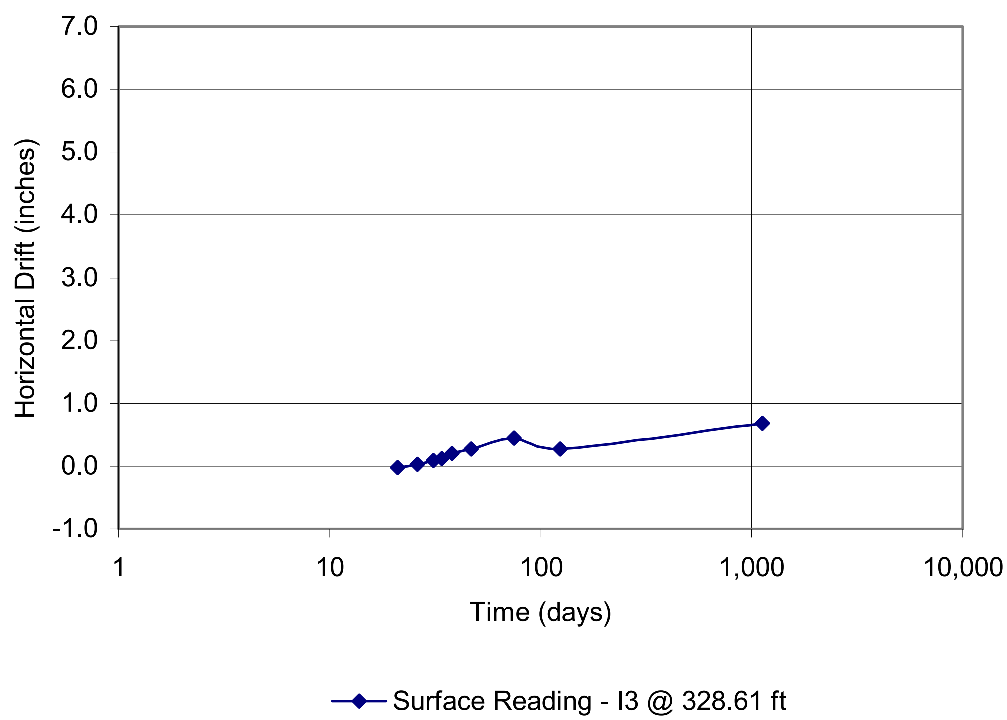

Figure O2. Horizontal drift as calculated from vertical inclinometer I3 near Elev. 328 ft (Original ground surface).

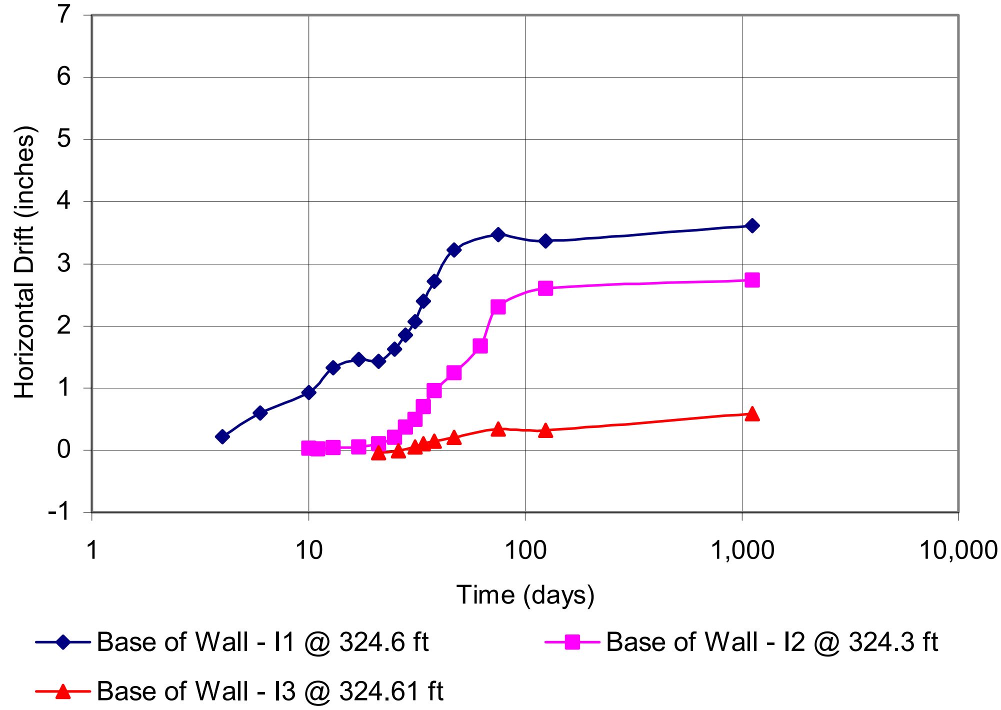

Figure O3. Horizontal drift as calculated from vertical inclinometers near Elev. 324 ft (Near base of wall).

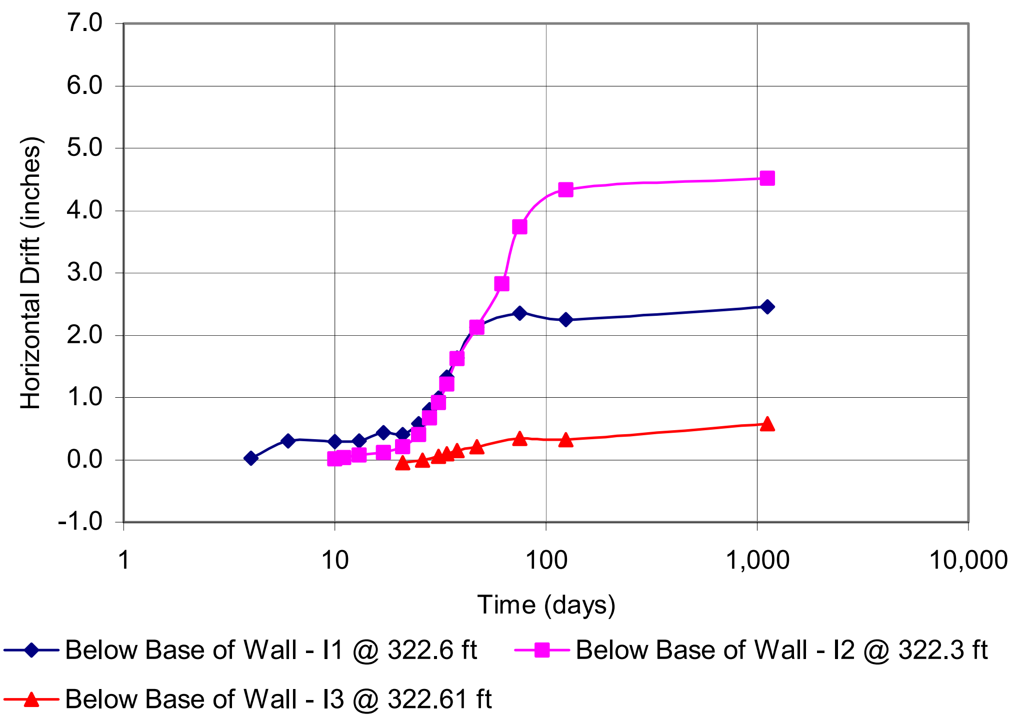

Figure O4. Horizontal drift as calculated from vertical inclinometers near Elev. 322 ft (Below base of wall).

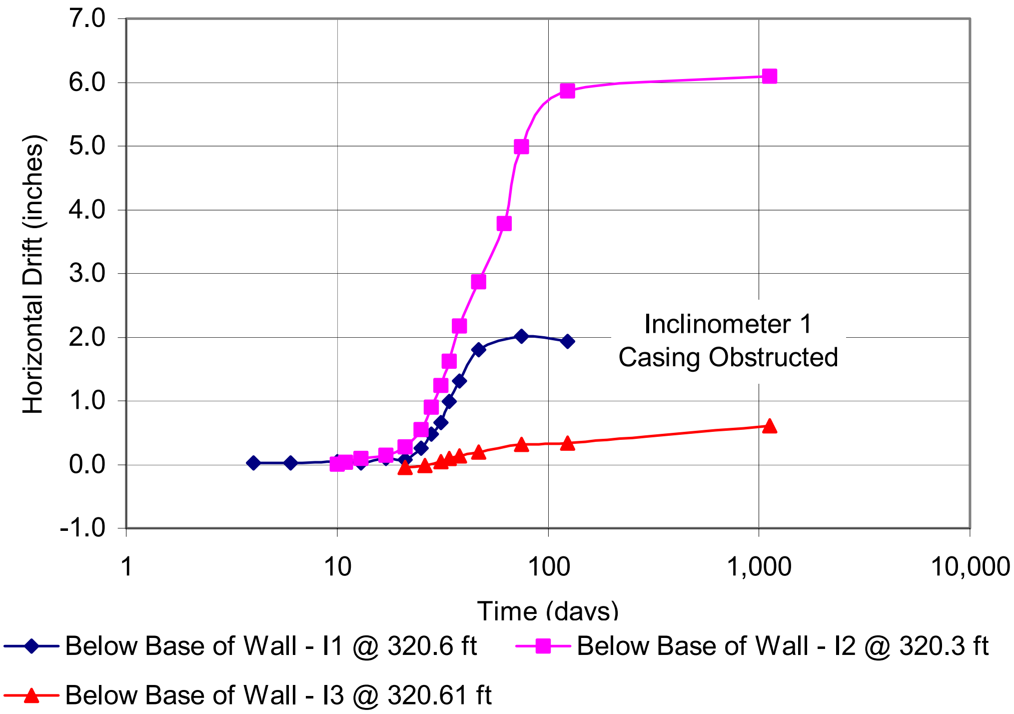

Figure O5. Horizontal drift as calculated from vertical inclinometers near Elev. 320 ft (Below base of wall).

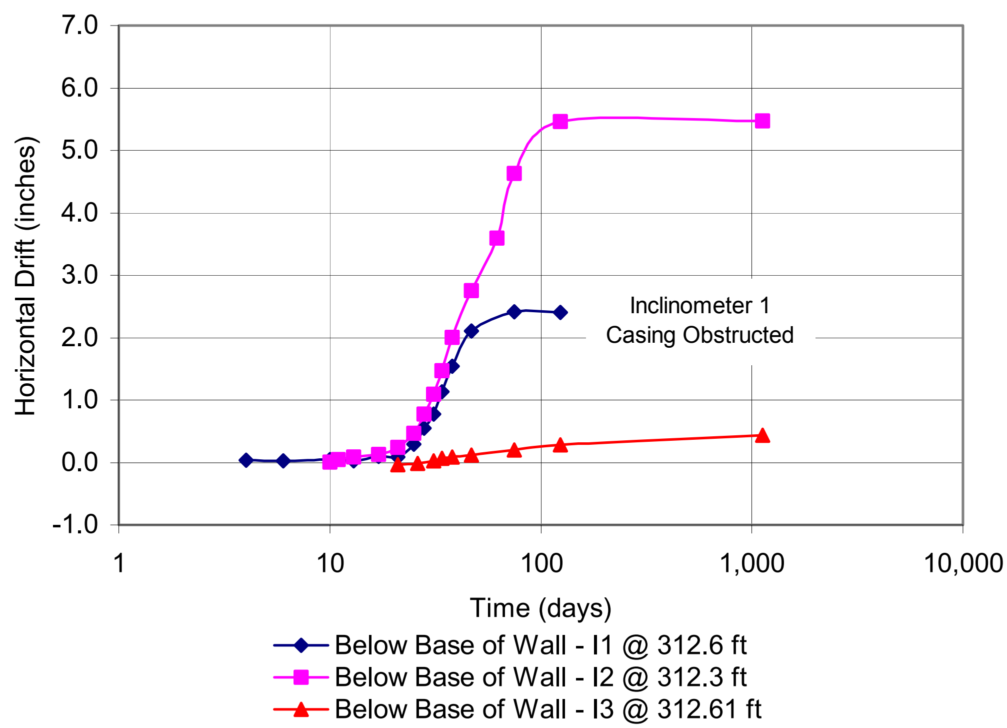

Figure O6. Horizontal drift as calculated from vertical inclinometers near Elev. 312 ft (Below base of wall).

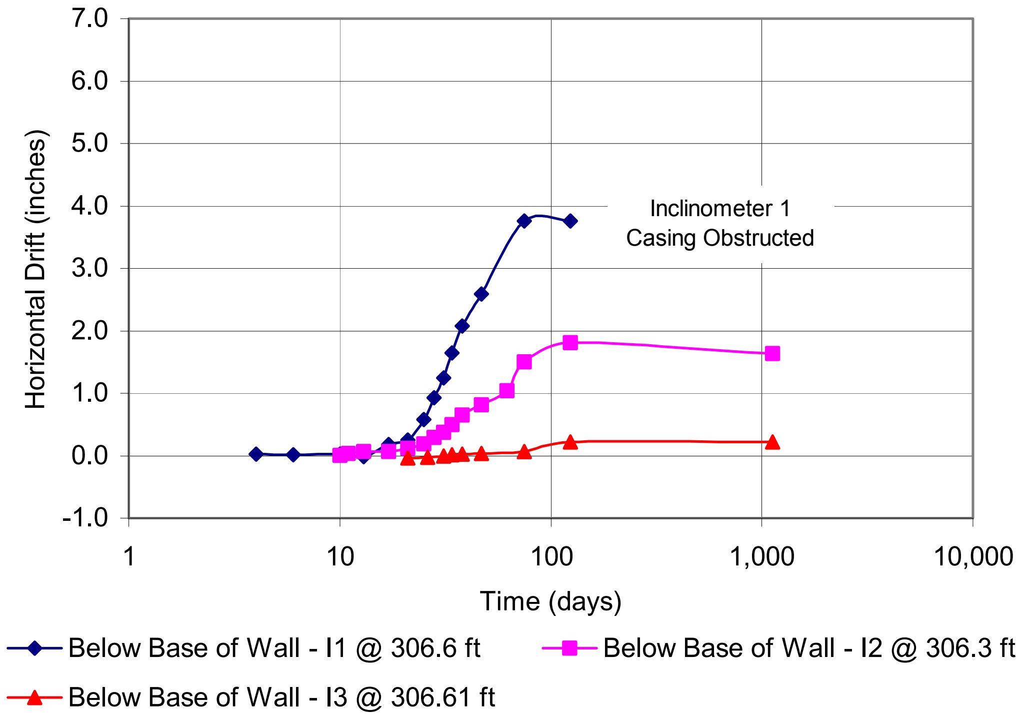

Figure O7. Horizontal drift as calculated from vertical inclinometers near Elev. 306 ft (Below base of wall).

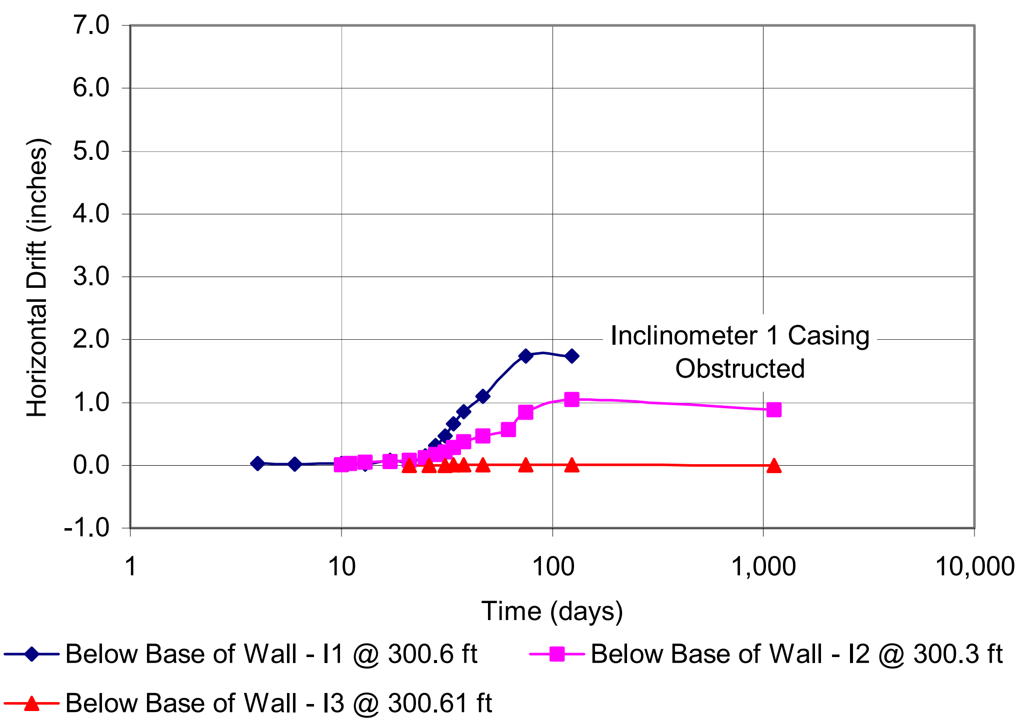

Figure O8. Horizontal drift as calculated from vertical inclinometers near Elev. 300 ft (Below base of wall).

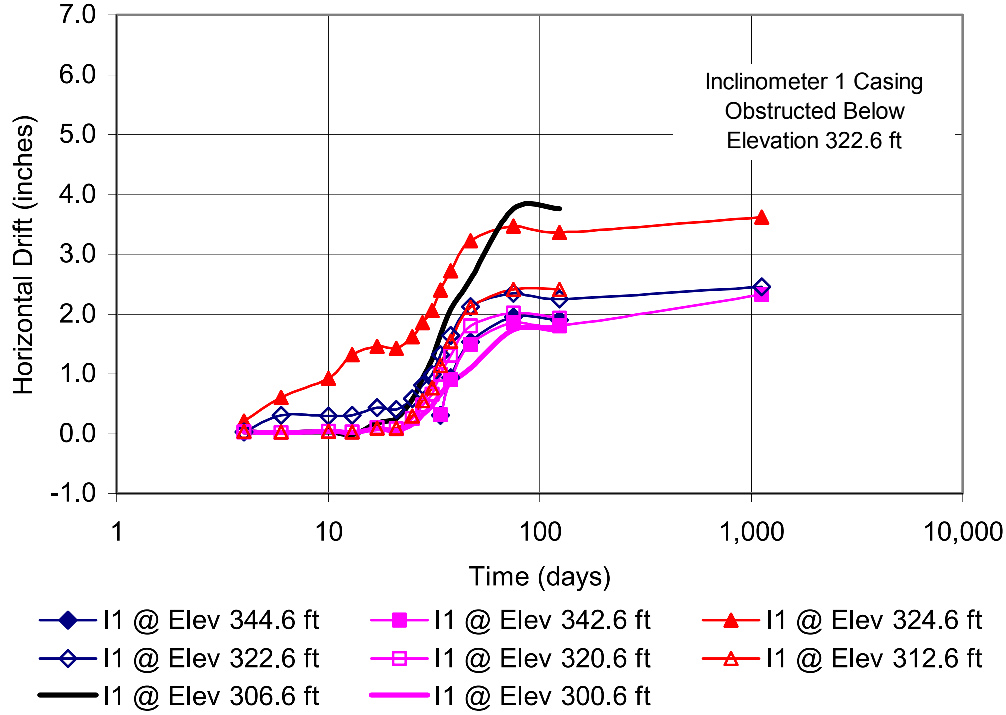

Figure O9. Horizontal drift as calculated from vertical inclinometer I1 for given elevations.

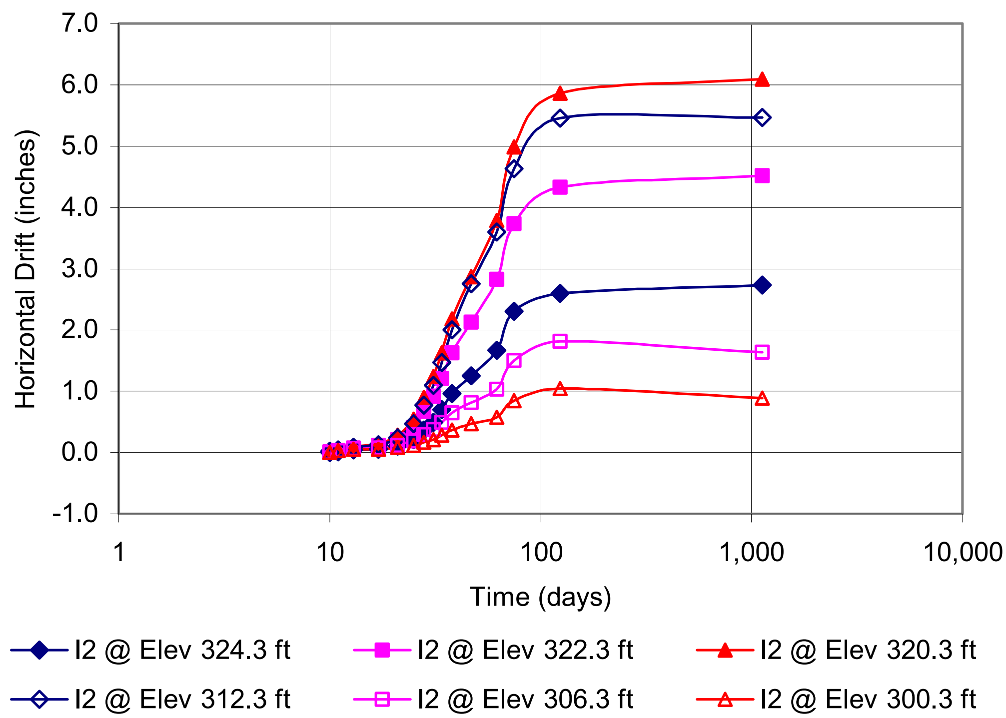

Figure O10. Horizontal drift as calculated from vertical inclinometer I2 for given elevations.

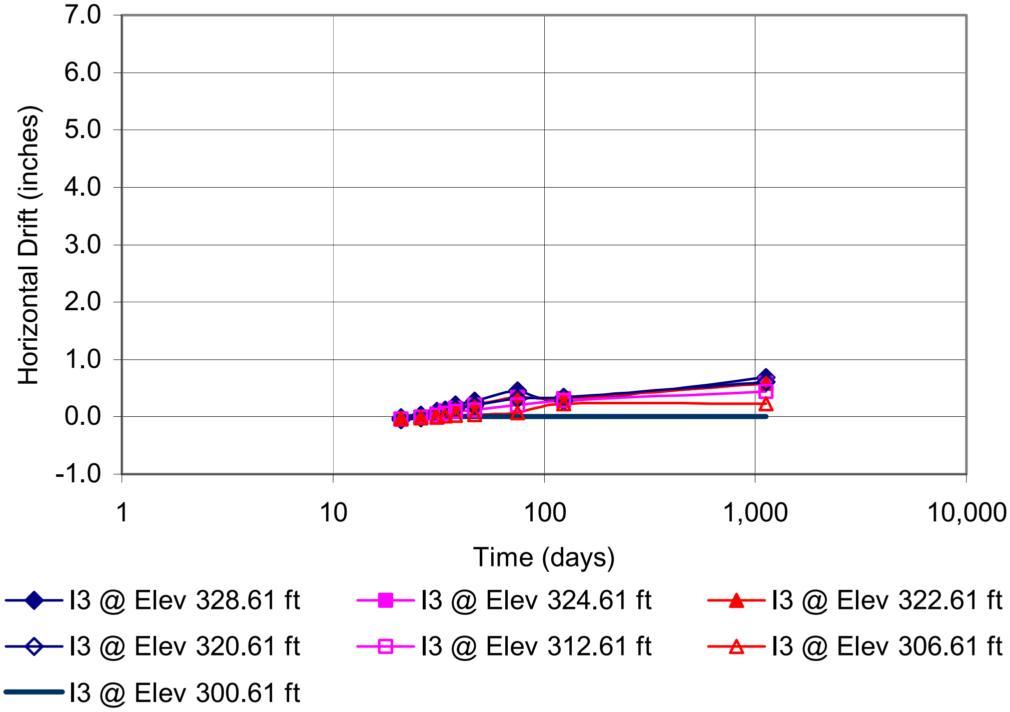

Figure O11. Horizontal drift as calculated from vertical inclinometer I3 for given elevations.